ANNUAL REPORT

OF THE

Department of Agriculture

OF THE

PROVINCE OF ONTARIO

1949

PRINTED BY ORDER OF

The Hon. THOMAS L. KENNEDY, Minister of Agriculture

ONTARIO

TORONTO
Printed and Published by Baptist Johnston, Printer to the King's Most Excellent Majesty
1951

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Ontario Department of Agriculture

REPORT

of the

Minister of Agriculture

Province of Ontario

FOR THE YEAR ENDING MARCH 31st, 1950

Printed by Order of
THE LEGISLATIVE ASSEMBLY OF ONTARIO
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1950

DEPARTMENT OF AGRICULTURE

PROVINCE OF ONTARIO

To The Honourable Ray Lawson, O.B.E.,
Lieutenant-Governor of Ontario.

May It Please Your Honour:

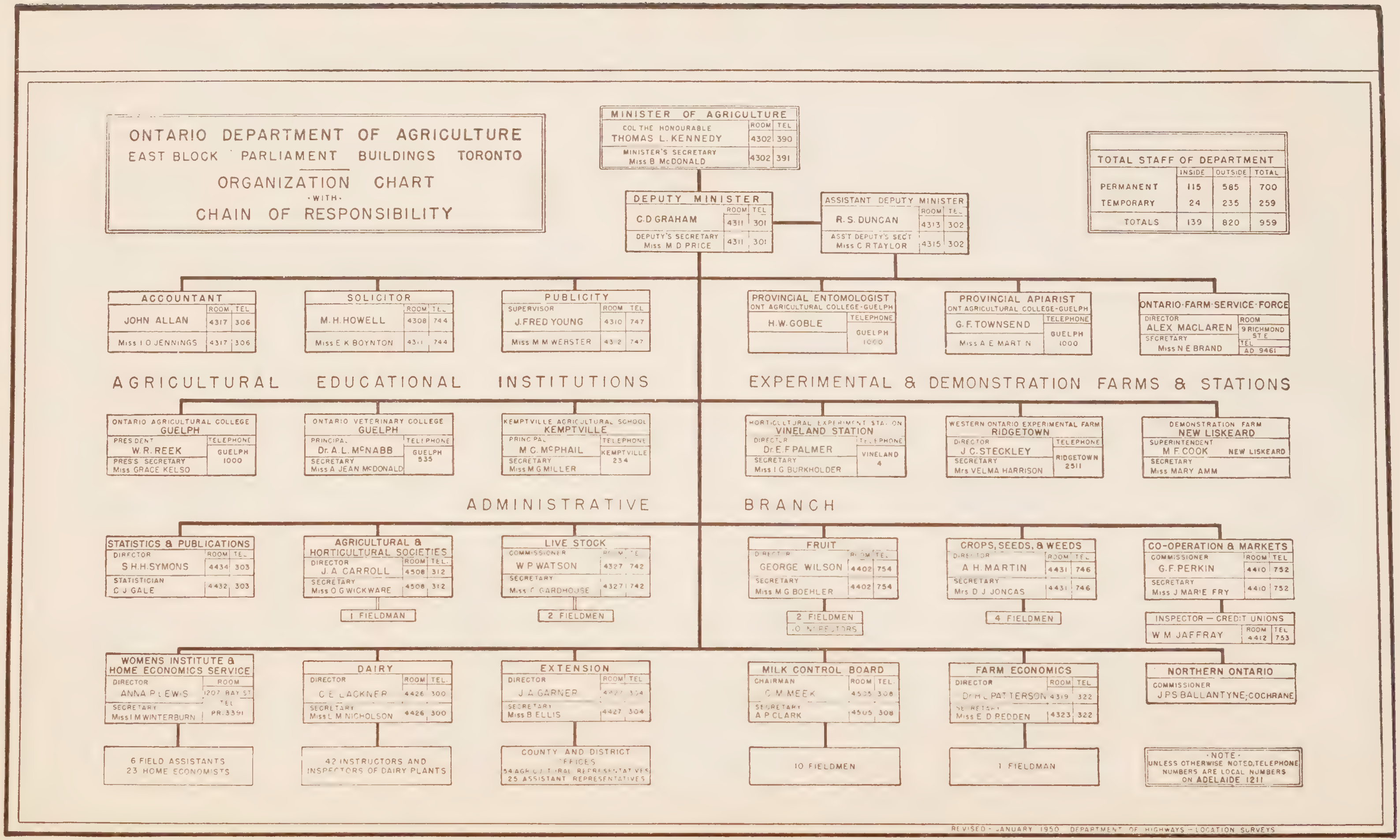
I have the honour to submit the Report of the Department of Agriculture for the year of 1949-1950.

I have the honour to be, sir,

Your obedient servant,

THOMAS L. KENNEDY,
Minister of Agriculture.

Toronto, March 31st, 1950.


ONTARIO DEPARTMENT OF AGRICULTURE
EAST BLOCK PARLIAMENT BUILDINGS TORONTO
ORGANIZATION CHART
·WITH·
CHAIN OF RESPONSIBILITY
MINISTER OF AGRICULTURE
COL THE HONOURABLE THOMAS L. KENNEDY ROOM 4302 TEL 390
MINISTER'S SECRETARY Miss B McDONALD 4302 391
TOTAL STAFF OF DEPARTMENT
INSIDE OUTSIDE TOTAL
PERMANENT 115 585 700
TEMPORARY 24 235 259
TOTALS 139 820 959
DEPUTY MINISTER
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ONT AGRICULTURAL COLLEGE-GUELPH
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PROVINCIAL APIARIST
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ONTARIO VETERINARY COLLEGE GUELPH
PRINCIPAL Dr. A. L. McNABB TELEPHONE GUELPH 535
SECRETARY Miss A JEAN McDONALD
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PRINCIPAL M C. McPHAIL TELEPHONE KEMPTVILLE 234
SECRETARY Miss M G MILLER
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DIRECTOR Dr. E. F PALMER TELEPHONE VINELAND 4
SECRETARY Miss I G BURKHOLDER
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DIRECTOR J C.STECKLEY TELEPHONE RIDGETOWN 2511
SECRETARY Mrs VELMA HARRISON
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2 FIELDMEN
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2 FIELDMEN
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6 FIELD ASSISTANTS
23 HOME ECONOMISTS
DAIRY
DIRECTOR C E LACKNER ROOM 4426 TEL 300
SECRETARY Miss L M NICHOLSON 4426 300
42 INSTRUCTORS AND INSPECTORS OF DAIRY PLANTS
EXTENSION
DIRECTOR J A GARNER ROOM 4427 TEL 304
SECRETARY Miss B ELLIS 4427 304
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54 AGRICULTURAL REPRESENTATIVES
25 ASSISTANT REPRESENTATIVES
MILK CONTROL BOARD
CHAIRMAN C M MEEK ROOM 4505 TEL 308
SECRETARY A P CLARK 4505 308
10 FIELDMEN
FARM ECONOMICS
DIRECTOR Dr H L PATTERSON ROOM 4319 TEL 322
SECRETARY Miss E D REDDEN 4323 322
1 FIELDMAN
NORTHERN ONTARIO
COMMISSIONER J P S BALLANTYNE, COCHRANE
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REVISED - JANUARY 1950 DEPARTMENT OF HIGHWAYS - LOCATION SURVEYS

ONTARIO AGRICULTURAL COLLEGE

While the total number of students has been less than in the preceding year, new courses have been inaugurated in many departments to provide for the second year of the new Degree Course in Household Science and for the first year of the new five-year course in Veterinary Medicine; most of this new first-year work is taught by members of the O.A.C. Faculty.

Research and extension activities have increased. Continued co-operation between departments and also with other groups engaged in agricultural research has shown gratifying results.

In June the College celebrated its Seventy-fifth Anniversary at ceremonies which were attended by representatives of many Canadian and American universities and by large numbers of alumni and friends. Other meetings of unusual interest held at the College during the year were those of the International Federation of Agricultural Producers and of the American Poultry Science Association.

ATTENDANCE

Of the 685 students enrolled in the regular courses in Agriculture, 647 were from Ontario, 17 were from the other provinces and 21 came from other countries. The total attendance for the year at Macdonald Institute was 127, of this number 71 were registered in the One Year Diploma Course, while 56 enrolled in the Two Year Degree course in Home Economics.

Summer Courses were given in July and August with an enrollment of 158. Other courses dealing with a great variety of subjects and varying in length from a few days to three months were held at different periods throughout the year.

The total attendance in special and short courses was 1,615; the grand total attendance in all courses was 2,300.

STUDENT ACTIVITIES

Continued co-operation among the students of the Ontario Agricultural College, the Ontario Veterinary College, and Macdonald Institute has produced very fine results in all branches of student activity. The work of the various Students' Councils and the programs of the College Royal and Students' Christian Movement have been carried out with marked success. In addition to the regular Sunday evening series of Nine O'clocks, three special Sunday evening concerts were presented by the Philharmonic Society, two by the Choral Club and one by the College Band.

The Union Literary Society has just completed one of the most successful years in its history. The inter-year debating series was the most extensive that has ever been carried out, while the O.A.C.-O.V.C. debating team has won the I.U.D.L. Trophy, symbol of victory in the Inter-University Debating League of Ontario and Quebec.

Both divisions, Army and Navy, have reported most favourably on the progress made by their respective officer candidates from the O.A.C. in the past year.

IMPORTANT EVENTS OF THE COLLEGE YEAR

The Seventy-fifth Anniversary of the founding of the College was celebrated on June 18, 1949. At the same time was held the annual reunion for the alumni of the Ontario Agricultural College and the alumnae of Macdonald

Institute. In addition to other guests and distinguished visitors, approximately 1,500 former students were present.

The Ontario Agricultural College was the scene of the Third Annual General meeting of the International Federation of Agricultural Producers from May 31 to June 10, 1949. Delegates representing farmer organizations from all parts of the world attended.

In recognition of his outstanding services to Canadian agriculture, Mr. W. R. Reek, M.B.E., B.S.A., President of the Ontario Agricultural College, was granted the honorary degree of Doctor of Laws by the University of Western Ontario at the Commencement held on June 5, 1949.

The 38th Annual Convention of the Poultry Science Association was held July 31st to August 5th at the Ontario Agricultural College with an attendance of over 750 poultry specialists and their families from all parts of Canada and the United States.

The first officers' conference of the Federated Women's Institutes of Ontario was held at the O.A.C., May 2nd to May 6th with six hundred presidents, secretaries, and other officers of the various branches in attendance.

Three teams from the Ontario Agricultural College, coached by the staff of the Department of Animal Husbandry, represented Canada at the National Intercollegiate Dairy Cattle Judging Contest, Waterloo, Iowa, at the Collegiate Live Stock Judging Contest held in connection with the International Live Stock Exposition, and at the International Intercollegiate Meat Judging Contest at the same show.

COLLEGE FUNCTIONS

Baccalaureate Service

The annual Baccalaureate Service for the graduating classes of the Ontario Agricultural College and the Ontario Veterinary College was held in War Memorial Hall on Sunday, April 3, 1949.

Right Reverend George H. Luxton, Bishop of Huron, delivered the sermon.

Diploma Course Graduation

On April 8, 1949, graduation exercises were held for the senior class of the Two Year Diploma Course. It was the first class to complete the new two-year practical agricultural course.

Convocation for Students in Agriculture

The first outdoor ceremony in the seventy-five year history of the Ontario Agricultural College, held on Wednesday, May 25, 1949, saw the largest class in history, 256 students, receive degrees of Bachelor of Science in Agriculture from Rt. Hon. Vincent Massey, Chancellor of the University of Toronto.

Addresses were delivered by Chancellor Massey and Dr. Samuel Beattie, Dean of the Faculty of Arts, University of Toronto.

Macdonald Institute Graduation

At the graduation ceremonies for students of Macdonald Institute held in War Memorial Hall on May 27th, 1949, 54 girls received diplomas presented by Dr. W. R. Reek, President of the Ontario Agricultural College.

SCHOLARSHIPS

During the past year a total of some 13 scholarships and prizes have been donated to the College for competition among its students.

THE WORK OF THE VARIOUS DEPARTMENTS AT THE COLLEGE

The following is a brief resume of the various projects being carried out by the departments of the college. More detailed information regarding these projects is contained in the Annual Report of the Ontario Agricultural College.

Department of Agricultural Engineering

Numerous research problems, ranging from the comparison of three methods of combining legume seed to the control of starlings by carbide exploders were studied by this department during the past year. Work on several long term projects such as the problem of dairy barn ventilation and insulation was continued and furthered.

The usual assistance of making drainage surveys was again extended to farms during the 1949-50 season. In eastern Ontario 15 drainage field days were held with the attendance varying from 100 to 2,500.

Members of the department assisted at Grassland Days held at Peterboro, Cornwall, and Thamesford. Assistance, advice and co-operation were provided in staging "Canada's First Soil Conservation Day" at Brooklyn, Ontario county. Contour plowing demonstrations were conducted at the International Plowing Match at Burford and at the King and Vaughan Match.

Department of Animal Husbandry

The past year has seen the continuation of long term departmental projects as well as the inauguration of several new studies in the field of Animal Husbandry. A study, now in its third season, concerned with the reclamation of marginal land for the production of beef has proven to be most encouraging. The sheep crossbreeding program was continued, results to date indicating that there is a definite place for crossbreeding in the profitable production of commercial lamb in Ontario. Work is proceeding on the supplemental feeding of pregnant sows. There is now definite indication that an approved ration influences the birth weight of pigs.

One of the most important aspects of the department's extension activity continues to be its participation in dairy herd classification.

Department of Animal Nutrition

Extensive studies were again conducted by this department into the many phases of animal nutrition. These studies included the following: the use of commercial animal protein factor supplements in poultry rations as studied by growth experiments, hatchability studies using commercial A.P.F. supplements along with an all vegetable protein diet, use of homogenized condensed fish in poultry rations, nutritional requirements for successful reproduction of swine.

Work was continued on the analyses and determinations of Riboflavin, Niacin, Panthothenic acid, Folic acid, Choline, Thiamine and Carotene.

This department was also engaged in several research projects in conjunction with other departments. These co-operative projects included studies on the nutrient content of hay and forage crops, as well as a determination of the calcium content of milk.

Department of Apiculture

As in previous years the topics of departmental research have been largely determined by the contemporaneous problems of local beekeepers. Additional assistance in the form of departmental services was extended wherever possible

to all concerned. Research topics included the following: Artificial Insemination, Queen Overwintering, and Fall Requeening. Work has begun on the development of a faster and cheaper method for determining the moisture content and subsequent grade of honey.

Services of the department during the past year included the registration of 202,908 colonies belonging to 4,875 beekeepers. Of the 55,689 colonies inspected, 5.4 per cent were found to be infected with American Foulbrood. Approximately 30 beekeepers' meetings were arranged in co-operation with the Ontario Beekeepers' Association.

Department of Bacteriology

The regular services of the department include the analysis of farm and school well water, examination of plant, food, milk and miscellaneous samples, preparation of legume cultures and the control of Pullorum.

In addition to these regular services active research is proceeding along a variety of lines. These include: Pullorum Artigen studies which have led to the isolation of an antigen now officially adopted throughout the Dominion, Non-Pullorum reactions, insect microbiology in connection with the Black Rot of Turnips, soil microbiology, food microbiology and potato scab research.

Department of Botany

During the past year the Late Blight Warning Service was organized to give timely advice, through press and radio, for the control of Late Blight on potatoes and tomatoes. Considerable time was devoted to the revision of bulletins, circulars and spray and protection calendars.

Experimental work on agricultural problems is being pursued along a variety of lines. Included in this year's projects were the chemical control of perennial, pasture and lawn weeds as well as couch grass. Apple orchard spraying experiments were again conducted, however the scab incidence on check trees was too low to give significance to the results. Continuing the work of 1948, large numbers of tomato varieties were tested for their resistance to Fusarium Wilt. Efforts to identify and further classify the pathogens involved in certain Pea and Bean diseases have met with considerable success.

Department of Chemistry

The teaching program of the department has been further expanded by the addition of three new courses.

Analyses for boron and zinc were carried out for the Legume Research Committee. During the year work was continued on the search for an inhibitor of potato scab in co-operation with the Potato Scab Committee.

Departmental research, using the tracer technique has been largely concerned with the rôle of phosphorus. In the field of spectrographic analysis, methods are being developed for the determination of minor elements in plant material.

The past year has also seen the successful completion of the work on the brucine method or the determination of nitrate in meat and soil extracts.

As in previous years numerous investigations have been undertaken at the request of other departments or in co-operation with them. The services of the department included the analysis of 76 individual samples submitted by the dairy industry. In addition, 66 special investigations were made in answer to inquiries accompanying samples submitted by the public.

Department of Dairying

The solution of problems peculiar to the dairy farmer and his products is the prime research concern of this department. With this in mind the following investigations and projects have been undertaken in the past year; a modification of the standard cheese vat has been proposed and blueprinted, satisfactory apparatus was developed for studying some of the factors involved in the formation of CO_2 from cheese, also a new method was evolved which promises to afford a simple yet rapid means of determining milk quality. A detailed study was completed on Canadian export cheese to determine the relationship between grade quality and *p*H. The effects of churning acidity and the *p*H of butter serum on the keeping properties of butter were investigated.

The services of the department were again extended to the creameries and cheese factories of the Province.

Department of English

During the year the teaching load was increased by the new courses being taught to the second year of the four year course in Home Economics. In addition, five courses in English were taught to first year students of the Ontario Veterinary College.

Extracurricular activities, such as the debates held by the Student Parliament, which are associated with the work of the department have reached a high standard of interest and performance. Coached by members of the department, this year's Inter-University debating teams reached the Dominion finals for the second time in three years. During the school year two plays and two concerts were successfully presented.

Department of Entomology and Zoology

A large variety of studies were conducted by this department in the past year. Orchard insecticide tests involving the evaluation of various insecticides against European Red Mite were investigated. Studies were undertaken to control and efficiently exterminate a large number of pests including the Turnip Aphid, Carrot Rust Fly, Army Worm, European Earwig, Warble Fly, Horn Fly and the House Fly.

The spray service program for Ontario (outside the Niagara Peninsula) was carried out this year as previously. This program is produced and carried out as a co-operative effort between this department and other provincial and federal agencies.

Department of Field Husbandry

The crop improvement program has been further enlarged. This work is concerned with the breeding and seed production of superior Cereal and Forage crops. Hay and pasture studies are being continued in an effort to study the productivity of grasses and legumes at various times of the growing season.

The department has co-operated with various companies in conducting tests on promising new corn hybrids and soybean varieties.

In the past year 744 plant introductions were made. These included grasses, legumes, wheat, oats, barley, rye, peas, soybeans, field roots, flax, millets, sorghums, and miscellaneous oil and drug plants.

Department of Horticulture

In the past year numerous tests and studies were conducted by the department, both at the college and in the field. The following projects were among

the many undertaken: processing vegetables, storage of cucurbits and plums, frozen food studies, the breeding of improved vegetables, conduction of vegetable variety trials at the Holland-Bradford Marsh, lily breeding, and gladiolus variety trials.

The soils laboratory of the department has analysed 7,000 samples for florists and vegetable growers under glass.

Department of Physics

Student instruction again constituted the main work of this department. Besides the usual courses given to students in agriculture, a completely new course in General Physics was inaugurated for first year students from the Ontario Veterinary College.

Increased advice and assistance in experimental design and analysis of data was afforded several departments. Weather data instruments were provided for the department of Apiculture in connection with their queen-rearing studies at Pelee Island. A similar arrangement was made at Brampton at the request of the department of Field Husbandry. The department continued as a contributing member of the Legume Research Committee by collecting, tabulating, and analysing the necessary weather data.

Department of Poultry Husbandry

Poultry breeding studies have been further extended in the past year. Tests were begun on the genetics and purity of colour type in White Plymouth Rocks and White Cornish to determine their usefulness in cross-breeding. The turkey breeding project progressed, with stock placed at the Ontario Hospital Farms supplementing the flocks at Arkell.

A comprehensive study of Manganese interrelationships in chick nutrition was conducted in conjunction with the department of Animal Nutrition.

Other feeding experiments included one designed to test the use of sunflower seed oil meal in turkey starter diets; another was conducted to determine the effect of initial protein feed percentage on the protein requirement for optimum growth of 9-15 week old turkeys.

The Flock Approval work continued in co-operation with the department of Bacteriology and the Dominion Department of Agriculture.

Department of Soils

In addition to the regular services of the department which include soil survey and personal visits to Ontario farms, work on laboratory and field experiments was not neglected. Co-operative research with the Legume Seed Setting Committee indicated that soil moisture was a primary limiting factor in 1949. Work done in conjunction with the Potato Scab Committee showed this disease to be more severe in soils with slight acidity than in those that were acid or alkaline. A field experiment to study the effect of applying autumn leaves directly, as a soil amendment, was laid down.

Soil survey maps and reports were published for Essex and Prince Edward counties, soil maps for Grenville, Huron, Perth and Dundas counties were prepared for printing. An additional area of 1,400,000 acres was covered during the the season of 1949 by a detailed reconnaissance survey under the joint Dominion-Provincial arrangement. By personal visits to some 600 farms as well as addresses at rural meetings, members of the department have given advice on soil management to farmers.

The Library

The circulation of books during 1949-50 has increased over that of the previous year. A total of 10,593 books were borrowed from the library. There were 679 books added during the year, giving the library a total of 48,956 volumes.

Department of Physical Education

The O.A.C.-O.V.C. fielded teams in the following intercollegiate sports: rugby, soccer, track and field, harriers, tennis, golf, badminton, boxing, wrestling, fencing, basketball, and hockey. The women's intercollegiate program included archery, basketball, volleyball, swimming and badminton. All intercollegiate sports were again provided on an intramural level, together with several others, such as rifle shooting, curling, etc. Students in first and second years were again required to take physical training.

Members of the department assisted in conducting the Field Days held on the campus during the summer months, as well as directing the sports program at the three Junior Farmer Camps held during the summer of 1949.

Department of Public Relations

This department again provided extension and publicity services of varied types for the College. These included: photographic extension, film extension, exhibit extension, and packet loan library.

Accommodation arrangements for students, married or single, as well as for the many conference visitors and delegates were handled through this department.

Macdonald Institute

Classes commenced on September 22, 1949, with 71 students enrolled in the Diploma Course, 31 in the first year degree course and 25 in the second year. The Household Science Committee of the Senate of the University of Toronto passed our proposed degree course work as it was presented for 1950-51.

Extension services were again extended by the Institute staff. Exhibits, demonstrations and programs were prepared for Farm and Home Week and for the Holiday Week of the Women's Institute. A number of lectures were undertaken by the staff throughout the year in the wide field of home economics. Approximately 1,500 people toured the Institute and watched classes in progress.

ONTARIO VETERINARY COLLEGE

The activities during the past year have been widely varied. Of special interest was the ceremony held on April 22 at which a portrait of the late Professor H. E. Batt was presented to the College by Year '38, a portrait of the late Dr. Andrew Smith, founder of the College, was presented by Year '23, and a landscape painting was presented by Year '47. In addition, the Ontario Veterinary Association presented an illuminated address to the Honourable Minister, in gratitude for the assistance which he has rendered to the veterinary profession. Later in the evening, three artists from the Toronto Conservatory of Music presented a most enjoyable musical programme.

On July 21 and 22, a representative group of veterinarians met at the Ontario College to take part in a short refresher course and attend a meeting of the Ontario Veterinary Association. The course included both small and large animal clinical sessions. Papers were presented on such subjects as canine hepatitis, mastitis, Listerella infection, and breeding problems.

The number of students enrolled at the College in September, 1949, was 433, 62 per cent of whom were war veterans. At the present time, the faculty of the College consists of 31 permanent, four temporary, and seven part-time members. The staff, including the secretarial, housekeeping, and infirmary personnel, is made up of 47 permanent, 11 temporary, and seven casual help.

The arrangement of the various departments of the College remained the same as during the previous year. However, the scheduled realignment of the Extension and Clinical Departments is now under way.

ACADEMIC STAFF

Dr. Lionel Stevenson, registrar and assistant principal, retired in September, after 23 years in the veterinary profession and 37 years of service to the agricultural industry as a whole.

Several additions have been made to the academic staff. Dr. J. Archibald was appointed to the staff of the Department of Small Domestic and Fur-bearing Animals; Dr. C. G. Wills joined the staff of the Department of Preventive Medicine and Hygiene; and Mr. B. M. McCraw, M.A., was appointed to the Department of Parasitology.

Several members of our faculty have been engaged in post-graduate studies. Those on leave of absence for this purpose were Dr. H. G. Downie, who is taking post-graduate work in physiology at Cornell University, and Dr. J. Schroder, who is engaged in studies in the pathological field at the Mayo Foundation, Rochester, Minnesota. Dr. E. F. Pallister has continued his studies in surgery under Dr. James Farquharson, at Colorado State College, Fort Collins, Colorado.

Dr. D. A. Barnum, who was on leave of absence while taking the course in Public Health and Hygiene at the School of Hygiene, University of Toronto, completed the course and received the Diploma in Veterinary Public Health. Dr. J. A. McGregor was granted leave of absence in order that he might pursue the same course of study at the School of Hygiene.

In May, Dr. J. A. Henderson returned from a visit of seven months' duration to the South American countries of Uruguay, Paraguay, and Argentina, where he studied disease problems of cattle.

THE UNDERGRADUATE COURSE

In September, the first class to enrol for the new five year course in veterinary medicine was registered. The prescribed course of study now extends

over five academic years at the Ontario Veterinary College, with a four-month period of regulated internship to be taken in the interim between the fourth and fifth years.

Students who registered prior to September last continued in the four year undergraduate course.

Admission Requirements

Certain minor changes have been made in the requirements for entrance to the College. These changes are designed to accommodate students who are completing their pre-veterinary course of studies in Grade XIII at the various collegiate institutes.

Curriculum

The five year course has an advantage over the four year course in that it gives the student a more complete grounding in the basic sciences and also in the clinical subjects. The first year of the course includes introductory courses in the basic sciences and in the husbandries. When realignment of the curriculum has been completed, the fifth year will be devoted mainly to clinical subjects — clinics in large and small animals and poultry, and clinical microscopy and pathology — so that the young graduate will be equipped with a more practical knowledge when he goes forth to practice his profession.

Extension Services

The marked increase in the number of specimens submitted and also in the demand for consultation, both in the field and at the College, has been most encouraging. Following is a summary of the various activities in the diagnostic services offered through the Extension Department of the College.

Mastitis

The total number of milk samples submitted for examination for the presence of mastitis infection was 16,061. Of this number, 5,325 samples were secured by members of the Ontario Veterinary College staff from herds under special study. A comparative study was conducted, to determine the efficacy of various antibiotics — penicillin, streptomycin, bacitracin, and aureomycin — in the treatment of mastitis infection. In 29 instances where other methods of control failed to bring forth the desired results, autogenous vaccines were prepared and distributed.

Brucellosis

In all, 69,683 samples of bovine blood were received and examined for the presence of the *Brucella abortus* organism. Tests were conducted on 24,462 samples of blood withdrawn from cattle intended for export or for show purposes.

In the calfhood vaccination programme, 174,102 doses of Strain 19 *Brucella abortus* vaccine were issued during the fiscal year, and 140,768 calves were vaccinated. Two hundred and eighty veterinarians participated in the vaccination plan.

During the year, testing was conducted on cattle in the Bruce Peninsula to determine the incidence of Bang's disease on an area basis. This is to be followed by an area calfhood vaccination programme with a view toward the complete eradication of the disease.

Kemptville Regional Laboratory Unit

Of particular interest is the development of the regional laboratory unit at Kemptville, Ontario. Dr. J. Gallagher has co-operated with the various agri-

cultural representatives in calfhood vaccination programmes in the eastern Ontario counties of Prince Edward, Hastings, Renfrew, Grenville, and Dundas.

Test for Parentage

Tests for proof of parentage have been undertaken by members of the haematological laboratory staff. Considering the intricacy of the test procedure, the staff of the laboratory have rendered an excellent service to cattle breeders.

This test has been applied in the following instances:

(a) When a breed organization has reason to question the parentage of a certain animal, blood samples from the supposed sire or sires, the dam, and the offspring are taken. The offspring's parentage may be determined since we know that its blood contains certain factors present in the blood of both the dam and the sire.

(b) When twin calves, one a male and the other a female, are born, and if the blood types of the two are identical, the female will be a freemartin or non-breeder.

(c) In artificial insemination units, permanent records of the blood types of all sires are maintained.

Poultry Diseases

The poultry diseases laboratory received 1,952 consignments of birds, comprising a total of 4,718 specimens.

In addition to the diagnostic work conducted, the following biological products were distributed for immunization purposes: fowl pox vaccine — 241,500 doses; pigeon pox vaccine — 11,100 doses; and laryngotraheitis vaccine — 84,500 doses.

In co-operation with the Connaught Medical Research Laboratories, investigational work was conducted in connection with immunization against laryngotracheitis and chronic infectious bronchitis.

Thirty-five visits were made to farms for purposes of treatment and investigation. Twenty-one meetings were attended and six radio broadcasts made. Twenty pamphlets on poultry diseases were prepared for distribution.

Small Domestic Animals

During the year, 1,700 dogs and cats were received for medicinal and surgical treatment.

Fur-bearing Animals

Our staff in this section of the Small Domestic and Fur-bearing Animals Department rendered the following services to the fur industry: 896 autopsies on fur-bearing animals; examination and treatment of 438 living animals; 452 complete blood examinations on experimental animals; 508 tissue sections from mink, foxes and chinchilla examined for evidence of pathological change; 35 blood sugar examinations on experimental animals; 86 examinations of a bacteriological nature; 172 x-ray examinations on experimental and diseased fur-bearing animals; examination of 102 tissue smears for the presence of inclusion bodies; and 57 examinations of food to determine its suitability for fur-bearing animals.

In addition to the diagnostic work, 61 consultations were given to ranchers seeking information relative to the raising of fur-bearing animals. Numerous

letters, giving advice on fur industry problems were sent to fur farmers and veterinarians. Nine articles were published in veterinary journals and fur magazines.

The following products were distributed to veterinarians for use in connection with a disease prevention programme amongst fur-bearing animals: 1,150 cc. autogenous bacterin and 11,250 doses of tissue vaccine.

Work was continued on the problem of distemper infection affecting dogs and fur-bearing animals. Experimental work was also conducted on cystic calculi in mink, Shigella infection in foxes, and fur-chewing and slobbers in chinchilla.

Large Animals

During the past fiscal year, 837 cases, including 259 horses, 272 cattle, 434 swine, 49 sheep, and 185 field consultation cases, were treated by members of the clinical staff. Three hundred and sixty-two cadavers (six horses, 77 cattle, 246 swine, and 33 sheep) were submitted for post-mortem examination.

RESEARCH

Studies have been made on various diseases of livestock and poultry. Several of these have been mentioned previously in this report. In all, 30 projects were undertaken, four of which may be listed as major projects, as follows: (1) infectious granular vaginitis of cattle; (2) enterohepatitis infection (blackhead) of turkeys; (3) chronic infectious bronchitis of poultry; (4) a study of (a) various antibiotics in mastitis therapy, and (b) the value of aureomycin in the treatment of certain conditions.

Laboratory studies and field investigation on infectious granular vaginitis of cattle have brought forth interesting results. An organism which has been described as the "H germ" has been isolated with great frequency from cattle infected with granular vaginitis. The transmissibility or infectious nature of this organism has been observed. Studies are being continued and further details will be available in the immediate future.

In connection with the research work on enterohepatitis infection (blackhead) of turkeys, the Ontario Veterinary College obtained quantities of Enheptin T from Lederle Laboratories, Pearl River, New York. Preliminary trials using Enheptin T indicated that this new preparation has an effective prophylactic action against enterohepatitis infection. Details of this work, which was under the direction of Dr. A. A. Kingscote, head of the Department of Parasitology, have been published by Dr. J. McGregor.

Chronic infectious bronchitis has only recently been detected in Ontario. In the study of this disease, the blood of poultry was examined for the presence of neutralizing bodies, which would indicate past and present bronchitis infection. Vaccines have been used experimentally to a limited extent, in the control of this type of infection.

Also of importance have been the field investigation of the incidence of liver fluke infestation in various communities of Ontario, and the testing of vaccines for prophylactic treatment of laryngotracheitis of poultry. The search for an agent which would effectively control infectious rhinitis of swine has been continued.

HORTICULTURAL EXPERIMENT STATION

The following paragraphs contain brief references to various Station activities and research projects. More extended reference, especially to completed or long-term projects, will be found in the Biennial Reports of the Experiment Station.

Staff Changes

Dr. J. H. L. Truscott, Chief in Research, Department of Horticulture, O.A.C. Guelph, was transferred to the Vineland staff July 1, 1949, as Director of the Horticultural Products Laboratory. Dr. Truscott designed the laboratory, in general and in detail, and has had the complete responsibility for its equipment as well.

RESEARCH

New Research Projects, 1949

Project 491. Mulch vs. Clean Cultivation for Currants and Gooseberries, (J. F. Brown)

Several varieties of black currants, two of red currants, and the Clark gooseberry, each five rows in width, are being used in this experiment. The treatments meet at the centre row, and records on amount and size of fruit are taken from Rows 1 and 2 (mulch) and 4 and 5 (clean cultivation). The planting was done in November, 1946, and mulching was commenced in 1947.

Project 492. Storage of Strawberry Plants. (J. F. Brown)

Strawberry plants are dug periodically in the fall, put in storage at various temperatures and humidities, and planted periodically in the spring using non-stored plants as controls. Records are being taken on stand, growth, freedom from root rot, and yield of fruit.

Project 493. Training Methods for the French Hybrid Grapes. (O. A. Bradt)

One, two, and three-year vines will be pruned at varying severities to determine the effect on form and early yield of vine. The effect on growth of vine resulting from bunch removal and bunch thinning will be investigated. This experiment is at the new grape Sub-station, the vines being on both sandy loam and clay loam soil.

The Horticultural Products Laboratory

Construction of the Horticultural Products Laboratory was begun in 1947. It is in partial operation with one staff member utilizing one of the nine laboratory rooms which will be available when the building is completed. Contracts are let for the remaining construction and heavy equipment items: laboratory furniture, temperature-humidity controlled cabinets, and a freight elevator. It is expected that construction will be completed by September, 1950.

It will be possible to begin preliminary investigations, in 1950, of several of the fields of interest of the new laboratory. Among those are trials of new varieties of fruits after processing by freezing and canning, and as juices and concentrates; gas-storage investigations will begin with pears; micro-biological problems will be represented by some studies on yeasts which have already begun.

The testing of purchased equipment and the making of new equipment will be a major work in 1950. The acquisition of senior staff capable of independent research is a major difficulty and the delay consequent to finding suitable staff will reduce the immediate effectiveness of the laboratory.

Fruit Merchandising Studies (in co-operation with Ontario Fruit Branch)

The shipping work of 1949 was largely a test of containers for plums and peaches. There were 35 shipments involving a total of 745 packages. Toronto, Sudbury and Ottawa were the receiving points.

Because of heavy bruising, the half-bushel export hamper was not satisfactory previous to the Elberta season. The B.C. box generally gave satisfaction but sometimes bruising was excessive. The Traypak was satisfactory, even with peaches only one or two days from the eating-ripe stage, when held at room temperature. Piled 25 high on a truck, without risers to take the weight, they carried well to Sudbury.

The new Jeffries carton holding a dozen peaches was well received but peaches smaller than 2⅜ inches in caliper did not fill the carton. The shipper for these cartons, holding 12 of them, was too large and the lid insecure. The fibre six-quart basket even with a wooden handle was received with little enthusiasm but the price is lower than the wood-veneer basket. The EZC Pak resulted in many skin breaks in the fruit and the slats and lids were insecure. The Kraft 3-qt. basket did not sell well. An open top would probably be better. The Kraft strawberry case was used for the early Japanese plums but evidently the retailers preferred to buy in six-quart baskets and break them up into quart boxes of their own, doubtless because there was greater profit in this procedure.

A total of 441 growers' packs of cherries, plums, and peaches was examined for defects with the following results:

Sweet cherries	— 51 out of 77 below grade
Sour Cherries	— 16 out of 36 below grade
Plums	— 116 out of 142 below grade
Peaches	— 167 out of 186 below grade

The packs fell down worst on maturity, both immature and overmature, sometimes in the same basket. In this year, (1949), lack of size was common in some packs of all fruits.

Elberta peaches, as in 1948, dropped to a limited extent for about a week before they were ready for the first commercial picking — a delayed natural thinning. Fruit from clay loam soils was less subject to rot wastage in the basket than fruit grown on sandy-loam soils, and stemless plums were more subject to rot than plums with stems intact. Most of the bruising in peaches occurred in picking, hauling, and dumping from the picking baskets, not so much on the grader (Bartlett).

Hose vs. Hand Thinning of Peaches

For four years hose thinning of peach fruits has been compared with the orthodox hand thinning. A heavy rubber hose attached to the end of a suitable stick has been used to knock off the excess fruits. As shown by the rate of growth of the tree, hose thinning has not been detrimental to the tree, has resulted in slightly heavier crop but of slightly poorer size. The greatest difference however, has been in time required for thinning — the use of the hose has cut the cost of thinning more than in half.

Table 1. Hand Thinning of Peaches, 1946-1949

	Growth rate of tree	*Yield per tree per year lb.*	*% above No. 2*	*Time per tree per year Minutes*
Hose	17	152	66	9.4
Hand	17	146	72	22.6

Congeniality of Some Pear Varieties on Quince A

There is marked variation in the behaviour of pear varieties on Quince A, the common rootstock in use for dwarfing purposes. Kieffer makes a weak union but grows well in the nursery only to succumb early in the orchard. Bosc has a somewhat stronger union, makes weak growth in the nursery, but improves in the orchard. Bartlett and Clapp Favorite make weak unions but, if given adequate and continuous support, may live a long time in the orchard. Hardy, Old Home, Anjou, and Duchess make strong unions with Quince A and are therefore recommended as intermediate stocks. A trial of these four intermediates for Bartlett and Bosc is now under way at Vineland.

Seedling and Clonal Rootstocks for Kieffer Pear

Some trees in Kieffer orchards bear small fruits even when carrying only a light crop. Most of these trees show very early leaf coloration, and size of fruit may be adversely affected thereby. However, the basic cause may be a poor rootstock or an unsatisfactory graft union. Examinations of the unions of nursery trees show that obstruction to water flow and weakness are usually present in trees which exhibit early leaf coloration in the fall of the year. A limited number of orchard trials with these trees indicates that many are short-lived or much dwarfed.

Of six Malling clones on which Kieffer is being grown, two have given very dwarf trees, only one-quarter to one-eighth the size of standard trees. However, the fruit borne on these dwarf trees has been normal in size. These clones were originally selected from seedlings of European origin.

Kieffer does not agree with all of its own seedlings for early leaf coloration, and dwarf trees are to be seen even in these combinations. The seedlings in use were open-pollinated and would probably be from an European male parent. Kieffer itself is a cross between the Chinese sand pear and the European pear.

Anis and Antanovka Rootstocks

In the fall of 1940 four varieties of apple on Anis, Antanovka, and French Crab seedlings were planted in the orchard. Seedlings of Anis and Antanovka are recommended as being more resistant to winter cold than French Crab seedlings. However, there is little known about their other potentialities. At the end of nine years there is little difference in size of tree except that Delicious on Anis seedlings is somewhat dwarfed. Yield differences also are small and probably insignificant.

Malling IV and Malling IX as Rootstocks for McIntosh and Northern Spy

Trees of Northern Spy on Malling IV are more than double the size of trees on Malling IX at the end of eight years in the orchard. After the same period McIntosh on Malling IV was more than three times the size of McIntosh on Malling IX. The trees on Malling IX came into bearing before those on Malling IV, and in Spy are still in the lead, but not so in McIntosh where the larger bearing-area soon permitted the overtaking of the trees on Malling IX. Because trees on Malling IV require staking and are large trees, difficult to support, there seems to be no advantage in the use of this rootstock under our conditions.

PLANT BREEDING

Distribution of Station fruit originations, both named introductions and seedlings for trial, for the two years 1948 and 1949, is given in Table 2.

Table 2. Distribution of Station Fruit Varieties, 1948 and 1949

Kind and Variety		Grower Distribution No. of Contacts	Grower Distribution Buds, Scions Plants	Nursery Distribution No. of Contacts	Nursery Distribution Buds (Plants)
Apple:	2 Sdlgs.	4	50 scions	--	------
Cherry:	Velvet	1	5 buds	1	750
	Vernon	5	100 buds	--	------
	Victor	3	100 buds	1	750
	17 Sdlgs.	50	820 buds	5	2,350
Peach:	Erlyvee	4	540 buds	2	600
	Vanguard	11	830 buds	1	200
	Vedette	2	50 buds	2	1,300
	Veefreeze	1	25 buds	--	------
	Vesper	--	----	3	375
	Veteran	6	365 buds	3	1,275
	12 Sdlgs.	96	800 buds 360 trees	-- --	------ ------
Pear:	1 Sdlg.	3	145 scions	--	------
Plum:	2 Sdlgs.	6	40 buds	--	------
Grape:	Sdlg. 29186	8	180 cuttings	--	------
	19 Sdlgs.	5	390 cuttings	--	------
Raspberry:	Vandyke	1	25 plants	--	------
	Viking	3	75 plants	--	------
Strawberry:	Valentine	19	975 plants	--	------
	Vanrouge	1	25 plants	2	40
	10 Sdlgs.	49	1,025 plants	--	------
		278		20	7,640

Valentine Strawberry

Named and introduced in 1942, Valentine has become widely distributed in the intervening eight years, not only in Ontario but across the Dominion. It is a cross of Premier and Vanguard, the latter an early-season Vineland introduction from a cross of Pocomoke and Early Ozark.

Generally the demand for plants has exceeded the supply, and several Ontario plant-growers report sales for 1950 varying from 70,000 to 100,000. Probably not less than a half million plants will be set out in Ontario in 1950, for 1951 cropping.

Acreage of earlier years has been sufficient to give Valentine a good test. As compared with Premier, the leading variety in Ontario, Valentine averages 5 to 6 days earlier, this being a primary reason for its introduction. Also growers like Valentine because of its firmness, (which makes it a better shipper than Premier), its good quality and ability to freeze well. It is less subject to rot because the fruit is held up better off the ground. On some soil types Valentine may prove a better all round variety than Premier, apart from earliness which, however, is its main bid for favor.

Grower observation is that Valentine does not make as full a row as Premier and does not yield quite as well. This may be due in part to its earlier blooming season, with the greater likelihood of the first blooms being caught by late spring frosts.

Elsewhere than Ontario, some reports are as follows. A British Columbia nursery notes Valentine as the best early. On the prairies Valentine has shown promise as a parent in breeding new varieties suitable for prairie conditions.

In Quebec one Dominion Experimental Station rates Valentine as the outstanding early variety, and another Station regards it very favorably.

Veteran Peach

Veteran is not a recent introduction (1924), but it exemplifies the wide distribution that sometimes comes to a variety bred for purely local (Niagara) requirements. As one of the "V" peaches (Vedette, Valiant, etc.) Veteran was introduced to extend forward the season of Elberta-type varieties. It normally matures about 10 days before Elberta.

However, Veteran needs better cultural conditions than most varieties, otherwise it matures too early and lacks top quality. Also, under Niagara conditions, it is usually semi-free only, a considerable fault.

Nevertheless Veteran is popular with growers in such widely separated places and diverse climates as Ontario, British Columbia, Washington, New York and Massachusetts. This is because of better than average hardiness, plus ability to set fruit readily under adverse weather conditions (cool, wet). It has been the most consistent performer in Ontario over the past 10 to 12 years. In British Columbia, where the "V" varieties are the backbone of the peach industry, Veteran is the favorite. And under B.C. conditions it is a freestone. Western Washington reports Veteran the most dependable variety for Coast conditions, where it leads the list of recommended varieties. It is a recommended variety in Western New York. A Massachussetts grower reports that it was the only variety which sufficiently escaped bud injury in March 1950 to produce a reasonable crop. In fact, all other varieties were very light to no fruit at all, as judged by surviving fruit buds.

Veteran seems to have found wide-spread favor because of dependability of orchard performance, this being more than sufficient to offset its faults.

Vulcan Greenhouse Tomato

Leaf Mold is the most destructive disease of greenhouse tomatoes in Ontario. It seldom attacks the fruit directly but by killing the foliage it reduces both the quality and the quantity of the crop. Fungicides and various practices for controlling the humidity in the greenhouse have not given satisfactory control of this disease. At present the use of resistant varieties is the only practical control for leaf mold in the fall crop.

Vulcan is the fourth in the series of leaf-mold resistant tomatoes developed at Vineland, in co-operation with the University of Toronto. Since the introduction of Vetomold and V-121, traces of the leaf-mold fungus have appeared which attack these varieties. V-473 is still resistant in commercial houses but is a little too small for Canadian markets. Vulcan was derived from a cross made in the fall of 1945 between V-473 and Vetomold. It has been inbred for eight generations. The first commercial tests were made in the fall of 1948 under V-4804. Preliminary trials have been so promising that a number of growers have expressed their intention of using Vulcan exclusively for the fall crop in 1950.

Vulcan grows more vigorously and matures a little earlier than Vetomold. The fruit cluster resembles that of V-473. It is slightly branched and has a short shank which gives it a compact appearance. Abundant pollen is produced and a high percentage of the flowers normally set. Five to seven attractive bright-scarlet fruits are produced in each cluster. The fruit is somewhat larger and a little deeper than that of Vetomold. Vulcan averages 4.7 fruits per pound whereas Vetomold growing under similar fall conditions averages 5.2 per pound. The fruits, which have several thick-walled cells, are firm-

fleshed, free from puffiness, and ship well. The quality is fairly good being equal to or slightly better than that of Vetomold.

Vulcan has the some mold resistance as V-473. It contains the combined resistance factors of the varieties Vetomold and Stirling Castle. It is immune from races 1, 2, 3, and 4 of the leaf-mold fungus *Cladosporium fulvum,* and is resistant to races 5 and 7. It is susceptible to the very rare races 6 and 8.

At present, Vulcan is recommended only for the fall greenhouse crop. A few growers have had satisfactory crops in the spring. Under most cultural conditions, however, the plants grow too rapidly and too high a percentage of rough fruits is produced in the spring. These faults are not usually apparent in the fall crop.

EXTENSION

Distribution of Propagating Material

Nurseries, and growers who propagate their own nursery stock, make considerable use of the Station variety orchards to secure a fresh start in true-to-name budwood and plants. The 1949 distribution of such material is shown in the accompanying Table 3.

Table 3. 1949 General Distribution of Propagating Material of Standard Fruit Varieties

Kind	No. of Varieties	Plants, trees	Scions	Buds	No. of Grower-Nursery contacts
Apple	32	100	60	1,755	14
Pear	26	7	480	1,760	22
Plum	20	30	235	3,300	15
Cherry	28	3	290	3,000	14
Peach	21	53	----	4,550	19
Apricot	5	----	----	425	6
Grape	29	60	2,745	------	15
Nut	1	----	25	------	1
Currant	15	----	1,200	------	8
Raspberry	7	225	----	------	3
Strawberry	8	550	----	------	15
	192	1,028	5,035	14,790	132

Vegetable Processing Crops

Processors' fieldmen are recognized as the pivots around which most progress in crop cultural practices will be achieved. The Canned Foods Association of Ontario has undertaken the sponsorship of the annual canners fieldmen's conference started by the Department a year ago.

Profitable production demands that contract growers produce and market high quality crops of considerably better than average yield. To achieve this only the best seed or plants available and only land suited for cash crop production should be employed. The reduction in contract acreage has retired some marginal land from can crops production usually in favour of a soil improving crop. This is as it should be. There is however, a great need for the adoption of improved production practices, for an improvement in the quality of tomato plants and for improved harvesting practices.

The quality of tomato plants produced for contract growers continues to cause concern. Efforts have been made, through circular letters and through

personal contact, to direct attention toward factors considered essential in producing superior plants.

During the past year 12 growers' meetings have been addressed and news items have been released from time to time dealing with the production of processing crops. One release outlined the basis and operation of scheduled planting based upon heat units. Unaware that scheduled planting is necessary if glut harvests of peas and corn are to be avoided and quality produce packed, some growers have opposed the practice of scheduling the planting of peas.

Achievement clubs continue to receive assistance. A picking and grading school was organized for the Haldimand Junior Tomato Club. The Prince Edward County Tomato Club and the Richmond Hill Agricultural Society competitions were scored. One club member, Mr. Clarence Vanclief, established a tomato production mark which will take some beating. He produced and marketed from his 4⅔ acres an average of 778 bushels per acre of which 761.4 bushels (22.84 tons) per acre were marketable. Of his total production, 76.8% graded No. 1.

Soils Laboratory

During 1949, there were 868 soil samples received for analysis and fertilizer recommendation. These samples were from 214 individual growers, mostly of fruit. Analyses results, and recommendations based both on the actual analyses and the history of the land treatment, were provided the growers.

A considerable part of the work of the soils laboratory has to do with various Station research projects, particularly where soil management studies are involved. The work involves methods and rates of fertilizer application, and physical and chemical measurement of the effects of various soil treatments, green-manure crops, mulch materials, etc.

Spray Service

The Niagara Peninsula Spray Service is a co-operative effort of the Dominion Laboratory of Plant Pathology, St. Catharines, the Dominion Fruit Insects Laboratory, Vineland and the Horticultural Experiment Station. The Dominion Laboratories advise on control measures and the Station is responsible for distributing spray calendars and circulars and maintaining a mailing list. Commercial fruit and vegetable growers, in Haldimand, Welland, Lincoln counties and the south part of Wentworth who request the service are placed on the mailing list. During the 1949 season, 20 circulars were mailed to fruit growers advising materials to use and time of application and suggesting modifications of the standard schedule of sprays given in the spray calendars.

There were 3,233 names on the mailing list on March 31st, 1949, and 2,891 names on March 31st, 1950. This includes about 100 names of local spray material dealers, manufacturers, Agricultural Representatives, district radio stations and the press.

STATION LITERATURE, APRIL 1949 TO MARCH 1950

Bulletins

473. Raspberry and Blackberry Culture. J. F. Brown, et. al., Feb., 1950.
475. Small Fruit for the Home Garden. W. J. Strong, Mar., 1950.

Popular Articles

Chemical Weed Control in Young Vegetable Crops. O. J. Robb, Second Meeting, Eastern Section, National Weed Committee. 1949.

Dwarf Pear Trees in the Home Garden. W. H. Upshall, Rural New Yorker, Feb. 18th, 1950.

Do You Know (Monthly Contribution). E. F. Palmer, Niagara Fruitman.

KEMPTVILLE AGRICULTURAL SCHOOL

In a year featured by severe drought in Eastern Ontario, and uncertain market conditions generally, it is encouraging to record that student enrolment increased in agriculture, dairying and home economics courses at the Kemptville Agricultural School. Virtually all graduates in agriculture returned directly to farm operations. Veterans' Land Act courses showed an expected decrease in numbers. Added equipment and the usual co-operative relations between staff and students resulted in a successful year of instruction.

Extension services of the School were pressed to supply help to farmers seeking aid to lower their costs of production in the face of shrinking markets. The demonstration of conservation and restoration measures accented new grassland practices, soil management, drainage, weed and insect control. An all-day visit to the school by the Select Committee of the Legislature on Conservation was a highlight in connection with these problems. It was clearly indicated to the Committee that a still greater expansion of facilities and staff is necessary to meet agricultural problems peculiar to Eastern Ontario. The school's part in the successful growth of night schools has helped to open an incalculable medium for agricultural instruction in addition to regular extension services. The school again maintained its position as host to many meetings and conferences of groups furthering agriculture.

Attendance in the different courses was as follows:

Agriculture	69
Home Economics	21
Dairying	38
Veterans' Land Act	12
	140

Friends and associations who have so generously indicated their interest in the School by donating scholarships are listed below:

Mr. George T. Fulford
Mr. J. S. McLean (President — Canada Packers)
The Brockville Rotary Club
The Ottawa Kiwanis Club
The Carleton-Russell Holstein Club
The Canadian Legion Branch 212 (Kemptville)
The Oxford-on-Rideau Co-operative Association
The Kingston Kiwanis Club
The Peterborough County Council
The Ottawa Farm Journal
Mr. J. I. Robinson (President — Crane Ltd.)
The Brockville Co-operative Association
Anderson's Department Store, Kemptville.

The Kemptville Agricultural School gratefully acknowledges the kind co-operation given by the following:

Agricultural Representative Branch; Ontario Department of Education; Ontario Department of Lands and Forests; Dominion Experimental Farms Service; Dominion Production Services; Ontario Women's Institute Branch; Ontario Live Stock Branch; Dominion Health of Animals Branch; Ontario Crops, Seeds and Weeds Branch; Dominion Department of Veterans' Affairs and Veterans' Land Act, and the Agricultural Weekly and Daily Press.

ANIMAL AND FIELD HUSBANDRY DIVISION

Due to the intense drought, which was more or less general in Eastern Ontario, the yield of crops at the Kemptville Agricultural School in 1949 was very disappointing. It was noted, however, that the quality of grain and forage produced was excellent.

The acreage seeded to grain was slightly reduced compared to some former years and the additional acreage thus released was devoted to the production of hay and pasture crops. It was found, with regard to oats, that the Roxton variety outyielded others. The vigorous growth and high yielding qualities of Roxton oats were noted particularly in pasture tests where they were sown with Sudan grass.

In spite of the dry summer, there were exceptionally good returns from the pasture acres. The dairy herd was turned out five days earlier than has been the average for a number of years and continued to graze later into the fall.

The pasture program for '49 was made up of permanent pasture and aftermath, supplemented with four acres of sweet clover and three acres of Sudan grass and oats. The acreage sown to sweet clover was heavily grazed and gave excellent results. This was broken up in late summer and seeded to fall rye, to which must go the credit for the extended fall grazing period. The acreage devoted to Sudan grass and oats was seeded down with fifteen pounds of sweet clover and six pounds of orchard grass per acre but the dry weather had taken its toll, for the stand, in the fall, was very thin.

Alfalfa, used as a basis in practically all the hay-pasture mixtures, certainly lived up to its reputation and proved to be a very good producer under drought conditions.

The demand for seed grain, which is usually made available by the School in some quantity, has never been so low as it is for this 1950 season.

A number of varieties of hybrid corn, both grain and ensilage, were tested on the farm. Some varieties of ensilage corn showed themselves to be particularly well adapted to the district and to the weather conditions which prevailed at that time. The grain corn showed considerable promise but was extensively damaged by birds in the late summer.

Test plots of hay and pasture mixtures were subjects for observation and were examined by farmers and agriculturists of the district. Cereal rod row tests of varieties of wheat, oats and barley were carried out but the rows were adversely affected by the dry weather.

Work involving the spraying of weeds in cereals with chemical weed killers was also undertaken with some success.

With regard to live stock, the swine herd was reduced to three sows, all of which farrowed during the early summer in colony houses. Their first litters were not moved into the regular pens until the pigs were three and a half months old. These pigs, along with another litter from each of the sows, have been raised in the regular pens and have not, as yet, shown any symptoms of rhinitis. Present litters are placed on feed cost tests.

Sales of live stock from K.A.S. farm include bulls, cows, pigs and lambs.

In the dairy herd, all cows and heifers were again on R.O.P. with 23 animals completing records during the year, all of which were above the requirements of the respective breed associations. Of these twenty-three records, all on twice a day milking, seventeen were made in the 305 day division, while eight recorded over 500 lbs. of fat.

Herd Average:

Animals	*No. on test*	*Lbs. Milk*	*Lbs. Fat*	*Average Test*
Holsteins	13	13,534	527	3.89%
Ayrshires	5	10,384	430	4.00%
Jerseys	5	7,667	475	6.20%

Numbers of animals in various age groups, on which above average is based:

Animals	*Mature*	*4 yrs. old*	*3 yrs. old*	*2 yrs. old*
Holsteins	4	1	4	4
Ayrshires	2	1	--	2
Jerseys	2	2	--	1

The high record for the year was set by a mature Holstein cow, K. A. S. Dewdrop Posch. She produced 17,206 pounds of milk having 688 pounds of butter fat at an average test of 4%. This cow was closely followed by a five year old Holstein with a production of 17,072 pounds of milk with 650 pounds of fat at an average test of 3.81%.

Live stock on the K.A.S. farm is used all the year round for judging work and demonstrations of showmanship, fitting, etc. Animals are made available for student work during the school year and are used, intermittently, during the summer and fall by various farmer groups from counties of Eastern Ontario.

CHEMISTRY, SOILS AND FERTILIZERS DIVISION

The projects dealing with this Division are summarized as follows:

1. *Co-operative Cereal Variety and Fertilizer Tests*

In co-operation with the Cereal Division of the Central Experimental Farm, drill width variety and fertilizer tests were laid out on four different farms in Eastern Ontario. These tests included different varieties of oats and barley, and in one location spring wheat, with fertilizer and check comparisons. The value of these tests is to ascertain the response of the various varieties to fertilizer, and the adaptation of the various varieties of cereals to the different locations.

2. *Demonstrational and Special Plots*

(a) Residual results of previous treatments.

(b) Methods of fertilizer treatment and placement on cereals and corn.

(c) Rates of treatment on grain corn.

(d) Continuation of long term fertility treatments.

3. *Soil Testing Service*

A 50% increase in samples received indicates the growing interest and recognized value of this service. The tests have shown there is a growing development of lower *p*H soil reaction. A summarized copy of the year's analysis is included. (See page 26).

4. *Regular Lectures and Special Meetings*

Besides the regular lecture and laboratory work assigned to this department during the regular school period, several meetings were attended under the direction of the various Agricultural Representatives, where soil, fertilizer and liming problems were discussed and recommended practices advocated.

SUMMARY SOIL TESTS 1949

KEMPTVILLE AGRICULTURAL SCHOOL

SOILS DEPARTMENT

County	No. of Samples	Nitrates Low	Nitrates Fair	Nitrates High	Phosphates Low	Phosphates Fair	Phosphates High	Potash Low	Potash Fair	Potash High	Reaction Acid	Reaction Neutral	Reaction Basic
Carleton	175	41.4%	39.4%	19.2%	61.4%	29.7%	8.9%	88 %	2.8%	9.2%	33.1%	28 %	38.9%
Dundas	117	43.6%	31.6%	24.8%	54.3%	33.3%	12.4%	95.7%	3.4%	.9%	14 %	34.7%	51.3%
Frontenac	140	37.1%	38.6%	24.3%	63.6%	22.8%	13.6%	64.3%	14.3%	21.4%	35.7%	34.3%	30 %
Glengarry	112	58.9%	26.8%	13.3%	61.6%	25 %	13.4%	84.0%	5.3%	10.7%	16.9%	48.3%	34.8%
Grenville	172	50 %	34.9%	15.1%	80.9%	14.5%	4.6%	80.9%	6.4%	12.7%	23.2%	24.4%	52.4%
Hastings	123	53.6%	33.3%	13.1%	82.1%	11.4%	6.5%	89.4%	5.7%	4.9%	26 %	30.9%	43.1%
Lanark	171	40.9%	37.4%	21.7%	65 %	21.6%	13.4%	72 %	14.6%	13.6%	18.7%	26.3%	55 %
Leeds	117	44.4%	44.4%	11.2%	77.7%	17.1%	5.2%	88 %	8.5%	3.5%	50.4%	21.4%	28.2%
Lennox, Addington	89	42.6%	47.2%	10.2%	71.9%	19.1%	9 %	90 %	1.1%	8.9%	24.7%	31.5%	43.8%
Misc.	51	68.7%	23.5%	7.8%	76.5%	15.7%	8.7%	78.4%	13.8%	7.8%	52.9%	15.7%	31.4%
Prescott	154	40.9%	29.2%	29.9%	63.3%	26.6%	10.1%	68.3%	12.9%	18.8%	44.8%	33.1%	22.1%
Prince Edward	93	60.3%	29 %	10.7%	64.5%	28 %	7.5%	74.3%	15 %	10.7%	6.4%	27.9%	65.7%
Renfrew	235	33 %	31.9%	25.1%	57.4%	27.3%	15.3%	66.6%	16.5%	16.9%	39.1%	35.7%	25.2%
Russell	66	36.4%	39.4%	24.2%	56.1%	19.7%	24.2%	91.6%	4.2%	4.2%	59.1%	21.2%	19.7%
Stormont	133	46.6%	27.1%	26.3%	62.4%	24.8%	12.8%	90.2%	4.5%	5.3%	12.7%	18 %	69.3%
TOTALS	1948	46.9%	34.4%	18.7%	65.5%	21.3%	13.2%	81.4%	8.6%	10.0%	30.1%	29.2%	40.7%

DAIRY DIVISION

The fifty-sixth session of the Dairy School for Eastern Ontario had an enrolment of thirty-eight students for the three months' diploma course. Fifty applications were received for the course but twelve were unable to attend. The registration showed the following seventeen counties or districts represented: Carleton 2, Cochrane 1, Dundas 4, Glengarry 1, Grenville 1, Hastings 9, Lanark 1, Lennox 2, Nipissing 1, Northumberland 2, Peterborough 2, Prescott 1, Renfrew 2, Russell 3, Stormont 3, Province of Quebec 2, France 1.

At the conclusion of the course thirty-seven students wrote the examinations for the Dairy School Diploma and of these seventeen passed with first class honours, thirteen passed with second class honours, five obtained pass standing, and two failed. The Montreal Provisions Trades Association again awarded one hundred dollars ($100.00) prize money to stimulate competition among the students. This is the thirteenth annual occasion that this award has been made. The Kemptville Creameries Limited awarded two prizes of thirty dollars ($30.00) and twenty dollars ($20.00) to the highest students in buttermaking with honour standing. This was the fifth year these awards were made. A silver trophy was again donated by the S. F. Lawrason Company Limited, London, Ont., to the student showing the best attitude to dairy work.

The Bacteriological Service supplying lactic cultures to cheese factories in particular and other dairy plants was conducted from the Dairy laboratories throughout the year. During 1949 six hundred and forty-six cultures were supplied to two hundred cheese factories.

Extraneous Matter Tests in Cheese were made during the months of May to October inclusive from 271 factories representing the number of vats of cheese made at each factory during one day of each month. The total number of tests made was 2,138. The factories were located in the counties of Carleton, Dundas, Frontenac, Glengarry, Grenville, Lanark, Leeds, Prescott, Renfrew, Russell and Stormont. The results of these tests show: No. 1 — clean 11.42%, No. 2 — fairly clean 81.05%, making a total of 92.47% acceptable. No. 3 — dirty 6.97%, No. 4 — very dirty .56%, making a total of 7.53% unacceptable. These results show a considerable improvement compared with tests made in previous years. Further progress is necessary to increase the percentage of No. 1 — clean, since according to this test only this class of cheese is reasonably sure of passing food laws and custom regulations of importing countries.

The usual laboratory services in dairy science were provided to the dairy instructors and dairy manufacturing plants in Eastern and Northern Ontario. During the year numerous visits were made to cheese factories, creameries, and dairymen's meetings and addresses on dairy subjects given.

Modern equipment was installed in the Dairy Building during the year for processing milk for the fluid milk trade. This equipment included a stainless steel pasteurizer, with recording and standard thermometers, stainless steel surface cooler and four-valve hand bottle filler and capping machine.

ENGLISH AND ECONOMICS DIVISION

Classes conducted by this division included English, economics, civics and public speaking for junior and senior students in agriculture. English, civics and public speaking were also taken with home economics classes. Library instruction was given to all students, including the Dairy School classes. Tutorial classes and exercises in English must be increased still further to raise the standard of expression for many incoming students.

Cataloguing for the new library has now produced at least the essentials of the Dewey Decimal System. This has enabled instructors to give more assignments requiring students to do reference work. Some attention can now be given to securing of more general reading material.

Considerable work was done in connection with vocational guidance departments of some forty secondary schools to explain courses and services offered to agriculture by the Kemptville Agricultural School. Addresses were given to Junior Farmers, Federation of Agriculture, Teachers' Institutes, and Service Clubs. Judging and coaching of public speaking projects for rural groups was another extension activity.

Additional school duties included guidance of the Literary Society in production of its regular programs, as well as direction of the annual play, public speaking contest and debate. This division also sponsored vocal instruction in music for the student choir. An operetta was staged in the winter term as a public performance.

Preparation of school calendar, press liaison, secretarial work for conferences, and management of an exhibit at the Central Canada Exhibition were some miscellaneous duties of this division in 1949-50.

FARM MECHANICS DIVISION

This division, during the year, lectured on farm mechanics subjects to the classes in agriculture, the Veterans' Land Act short course, as well as assisted with eight night schools throughout Eastern Ontario on agricultural engineering subjects. During the summer this division, working in co-operation with the drainage division of the Ontario Agricultural College, did the field work for the Ontario Department of Agriculture Drainage Service in Eastern Ontario and supervised two Tractor Clubs.

Night Schools — Eastern Ontario — November to March

This division, working in co-operation with the Extension division of the Ontario Department of Agriculture, Toronto, organized and supervised the time table and courses of study for seven different courses which were given at night schools throughout Eastern Ontario.

Each course consisted of two hours a night for six nights. In all there was a total of forty-four classes and the total attendance at these courses was 556 students.

Demonstration Equipment

During the year a number of tractors, pumps and water systems and other equipment were loaned to this division for class work for which thanks are due the following:

> *Massey Harris Co. Ltd.; International Harvester Co. Ltd.; Cockshutt Plow Co. Ltd.; Ford Motor Co. Ltd.; John Deere Co. Ltd.; Allis Chalmers Co. Ltd.; The Oliver Corporation; Truck and Tractor Equipment Co. Ltd.; Beatty Bros. Limited; F. E. Myers and Brothers Co.*

Educational Trips

The senior students in agriculture were taken on a trip through the farm implement manufacturing plant of the Cockshutt Plow Co. Ltd., Smiths Falls.

Drainage Field Work

During the summer of 1949 this division did the field work in Eastern Ontario for drainage service for the Ontario Department of Agriculture. A total of 274

farmers received drainage assistance of one sort or another: 97 visits were advisory, 72 preliminary surveys, 30 surveys in which a total of 151,598 feet of profile was prepared, 44 surveys in which detailed drainage plans were prepared for 2,430 acres. There were 31 inspections of tile drains after they had been installed.

Through the co-operation of the Crop Improvement Associations, the Soil Improvement Policy of the Ontario Department of Agriculture, this division co-operated with the Agricultural Representatives in the different counties in organizing and conducting fifteen drainage field days throughout the season. The attendance at these events ranged from 100 to 2,500. The average number of drainage machines demonstrating at each of these field days was twelve.

Grassland Day

This division took an active part in connection with organizing the machinery display and conducting the demonstration at the Grassland Day at Cornwall in July.

Agricultural Engineering Enquiries

Requests for assistance in installing water and sewage disposal systems has increased very markedly. Also, during the year some twenty-five visits were made and plans prepared in connection with renovating old or constructing new farm buildings.

Meetings

During the year twenty-two farmer meetings were addressed by this division on drainage or other engineering subjects with approximately 1,000 in attendance.

HOME ECONOMICS DIVISION

The Home Economics division gave instruction to the two year diploma course in home economics and the one year homemaker course, and supervised the maintenance of the students' residences and dining halls.

Regular classes in home economics included lectures and practical work in the following subjects: clothing and textiles, applied art, home furnishings, foods, home management, nutrition, health education, home nursing, child development and care, and family living.

This department is grateful to other divisions for instruction to home economics students in the following subjects: chemistry, bacteriology, English, civics, woodworking and physical training.

The K.A.S. Royal Show proved an opportunity for display of practical work in competition, in clothing, handicrafts and home decoration. Achievements in clothing and foods classes were displayed in the Spring Fashion Show and tea presented to a large group of local and visiting Women's Institute members and friends.

Regular accommodation in residence was provided for students, with accommodation in huts for V.L.A. students and Dairy students.

Approximately 52,000 meals were served during the year to students and to visiting groups.

HORTICULTURE DIVISION

During the summer months it was found possible to build, with staff labour and some adapted material, an additional greenhouse planned particularly

for student instruction in horticulture and biology. Prior to this addition, facilities in this regard had been quite inadequate.

The winter was not severe and orchards in this district came through in fairly good condition.

Despite a long period of dry weather, during the mid-summer months, some very fine crops of apples were produced in many Eastern Ontario orchards. During mid-season harvesting, however, very high winds blew down a quantity of this fruit, in some cases amounting to thirty percent of the crop.

Owing to the seasonal conditions previously mentioned, spring planting of orchard trees and some types of bush fruits proved unsatisfactory.

During the year a number of personal visits were made by the members of this division, particularly to members of the St. Lawrence Valley Fruit Growers' Association, who had requested this service. Assistance was given to different organizations in planning community and school grounds and in a variety of other projects.

A number of meetings were attended, at some of which talks were given on a variety of horticultural subjects.

Lectures and laboratory instruction were given in horticulture, botany, entomology, plant pathology, and genetics to the regular students in agriculture and to a class of veterans during the spring months.

POULTRY DIVISION

Lectures and demonstrations in poultry, meats, and feeds were given to the students in agriculture.

Considerable extension work was carried on with special emphasis on poultry disease. Some thirty meetings of Farmer Clubs, Junior Clubs, Women's Institutes and Service Clubs were visited. These meetings were attended by approximately 1,500 people. Several Junior Farmer Poultry Club Achievement days were visited and two hundred and eighty dressed birds were judged.

The school flock of Barred Plymouth Rocks and White Leghorns had a very good year and some of the birds made very good records.

The new hen house proved quite satisfactory and with some minor adjustments will be very useful.

It is felt that a new service building should be erected to house the incubation, candling room and a class room for judging and other related work.

WESTERN ONTARIO EXPERIMENTAL FARM

The Western Ontario Experimental Farm produced about average crops in the season of 1949. May and June were drier than usual but normal rainfall during the summer and fall months brought average yields on the Farm. It rained on eleven days in April, ten in May, six in June, six in July and eight in August. Harvesting conditions were excellent throughout the season. It was possible to harvest hay and other crops without any interference from the weather.

The cropping system was similar to former years. Seed was produced from wheat, oats, winter barley and soy beans with the usual program of producing Hybrid Corn Foundation Seed for the Hybrid Seed Corn Producers and Foundation Bean Seed for the Ontario Bean Marketing Board.

The following acreages of the main crops were:

Winter Wheat	40 acres
Oats	50 acres
Corn	50 acres
Beans	20 acres
Soy Beans	27 acres

A hundred acres of land next to the Experimental Farm were rented for the season which made it possible to produce a great deal more of Hybrid Corn Foundation Stock on our own land. This saved considerable money and time as it was not necessary to have this produced by farmers of the district. In other years it was always necessary to travel considerable distances to get the proper isolation for this seed production. By controlling a larger acreage we were able to grow foundation corn on eight separate isolations on our own farm. By having this extra land we were also able to produce considerably more roughage feed for livestock. In former years so much of the land was needed for seed production that it was often necessary to curtail the production of crops for livestock feeding.

The Livestock Program was kept at about the usual numbers of the past few years. We are maintaining a herd of about fifty Shorthorn cattle and around one hundred Yorkshire swine. These are kept at the present time for experimental and demonstration purposes. No livestock has been sold for breeding purposes for the past few years. Arrangements have been made with South Western Ontario Livestock organizations to supply breeding stock for the district and assistance has been given these organizations in conducting sales. We believe that as long as these organizations do this the Experimental Farm will use its livestock for commercial, experimental and demonstration purposes.

A flock of five hundred barred rock hens is being maintained. Fewer eggs were sold for hatching purposes during the past year. Egg production, however, has been better than usual, probably due to the use of electric lights.

EXTENSION

The usual amount of extension work was done. Agricultural meetings were attended throughout Central and Western Ontario. Short Courses, Farmers' Week programs were assisted whenever possible. Assistance was also given at Conventions, Provincial Agricultural Committees, Seed Fairs, Junior Farmers Organizations and Agricultural Fairs. Addresses were given, Demonstrations conducted and Educational Exhibits were displayed in some instances.

Many Agricultural Organizations visited the Farm throughout the year. Among these, the following meetings were held at the Farm:

Kent County Crop Improvement Spray Day.	Ontario Bean Marketing Board.
Western Ontario Junior Farmers' Field Day.	Ken Elgin Potato Co-operative.
Junior Farmers' Leadership School.	Ontario Early Potato Board.
Boys and Girls Club Leaders' School.	Kent Hereford Breeders.
Legislative Committee on Conservation.	Tri-County Shorthorn Breeders.
Kent Junior Farmers	Kent Holstein Club.
Ontario Corn Committee.	Elgin Crop Improvement.

Besides these, many smaller groups have visited the Farm during the year. These numbers have been larger than usual and there seems to be a steady increase of individual farmers bringing their problems to the Farm. Among the many problems that have been brought to our attention the following seem to be the most common:

Poultry Problems,	Insect and Plant Disease and
Fertilizer,	Livestock Feeding.
Herbicides,	

A regular service is maintained on Poultry Problems, Soil Testing and Spraying information.

FARMERS' WEEK

Farmers' Week was held as usual from January 9th to 13th. The attendance this year was higher than usual, over one thousand people were present during the week and the main problem was to get sufficient accommodation for them. The following information was given on the programme for 1950:

January 9 — Field Crop Day

Crop problems in South Western Ontario, by representatives of the Crop Improvement Associations of Essex, Kent, Elgin, Middlesex and Lambton.

Dr. Ward Koch, Plant Pathology Laboratory, Harrow.

Mr. George Manson, Entomology Laboratory, Chatham.

January 10 — Soils Day

The Effects of Crops and Cropping Systems on Soil.

Dr. F. Stinson, Head of Soils Department, O.A.C. Guelph.

Experiences in Irrigation — James McGuigan, Cedar Springs.

January 11 — Livestock Day

Health Problems of Cattle and Swine — Dr. R. A. McIntosh, O.V.C. Guelph.

Beef Judging Competition — You are invited to see if you can place the animals as they will appear on the rail. Prizes awarded to non-professional contestants.

January 12 — Experimental Farm Day

A Review of the Experimental Work at the Ridgetown Experimental Farm in 1949.

January 13 — Beef Day

Cutting demonstration and judging of the beef carcasses of animals shown in Wednesday's Program — Professor E. C. Stillwell, O.A.C. Guelph.

EXPERIMENTAL DEMONSTRATION WORK

1. Cattle — The herd of cattle maintained at the Farm has been used for experimental as well as demonstration purposes. The demonstration work has been to show where cattle will fit into cash crop area. There are several problem fields on the Experimental Farm. These have been put down to permanent pasture mixtures and the cattle have been used to utilize the grass produced on these areas.

In winter the cattle have been fed largely on the by-products of cash crops. For roughages corn stalks, soy bean and white bean straw were used extensively while for concentrates cull corn, oats cleaned out of the seed bin and cull soy beans as concentrates. They came through the winter in good condition and the young stock made satisfactory gains on this ration.

A group of young steers were fattened during the winter months. Their roughage ration consisted of white bean straw and hay, a feed of each per day. They were fed on two different meal rations. The one consisted of 60% corn, 27% oats and 13% soy beans, the other corn and cob meal was substituted at the same rate as the shelled corn. Both these meal rations were put through the hammer mill. The group fed corn and cobmeal gained six hundred and six pounds in the twelve week period while the group fed the shelled corn gained six hundred and eighty pounds during the same time. The corn and cob group gained 2.1 pounds each per day while the group on shelled corn gained 2.6 pounds per day. It required 22.5 pounds of the mixture containing corn cob meal to produce one pound gain while on the ration containing the shelled corn it required 22 pounds to make a pound gain.

The results show better gains from the animals fed shelled corn. It should be borne in mind, however, that the meal was fed in equal quantities. It also shows that a meal mixture, when there is considerable bulk such as provided by the oats which were light, would require a little more corn and cobmeal than shelled corn to produce equal results.

SWINE

The swine breeding herd consists of two boars and ten sows all registered Yorkshires. No breeding stock was sold and the herd was run on a straight commercial basis. As much as possible they were fed by-products of cash crops. During the summer months boiled cull potatoes were fed, in much the same manner as in the previous two years. About forty percent of potatoes were used in the ration. In the winter cull white beans were fed. These were boiled and used along with tankage and third cut alfalfa hay as protein supplement in a ration that contained about fifty percent corn. Corn has once again become cheap enough in comparison with other grains to be fed to pigs.

In recent experiments it was shown that pigs will pay for the shelling and grinding of the corn. Pigs fed cob corn required 4.7 pounds of meal per pound gain, shelled corn 4.1 pounds and corn meal 3.7.

There has been considerable corn fed throughout the district and some have recommended corn and cob meal as pig feed. With this in mind an experiment was run during the past winter to determine the efficiency of this product in a ration for hogs. Three lots of pigs were used. They all received the following mixture — fifty pounds corn, forty pounds oats and ten pounds of meat meal along with a small amount of alfalfa hay.

Lot Number 1 — the meal was put through a small grinder.

Lot Number 2 — the meal was put through the hammer mill.

Lot Number 3 — cob corn replaced the shelled corn and was put through a hammer mill.

The Lots Numbers 1 and 2 gained much faster than the lot receiving the corn and cob meal. They also looked more thrifty. It was apparent from the appearance of the pigs that there was too much fibre in lot number 3 that were being fed the corn and cobmeal. The following table will give the results of this experiment over a period from January 6th to March 16th.

	Lot Number	Gained	Fed	Amount Required to make one pound gain
	1	571 lbs.	2,535 lbs.	4.4
	2	631 lbs.	2,963 lbs.	4.6
(Cob Corn Meal)	3	467 lbs.	2,792 lbs.	5.9

It will be noted that the first two lots of these pigs were fairly uniform in the economy of gain but lot number 3 getting the corn and cob meal in place of the shelled corn required more to make a one pound gain. They were also not as thrifty as the other two lots of pigs.

SOILS

For the past eleven years a section of the Farm has been laid out for a permanent soil fertility test. This plot is divided into eight one-half acre plots with the following soil treatment.

Plot Number 1 — gets clover plowed down every second year. Barnyard manure once in four years and commercial fertilizer every year.

Plot Number 2 — gets the same treatment except it does not receive any commercial fertilizer.

Plot Number 3 — gets only clover plowed down every second year.

Plot Number 4 — gets the clover treatment and commercial fertilizer.

Plot Number 5 — gets barnyard manure only.

Plot Number 6 — gets commercial fertilizer only.

Plot Number 7 — gets same treatment as Number 1 but is left in hay crop one year in every six.

Plot Number 8 — is left two years in hay out of the six.

The rotation that has been practised on this land is the same as one of the main sections of the Farm, namely, wheat, corn, oats and white beans. In 1949 the crop grown was Hybrid Foundation corn. There were only six plots in corn as the other two plots were in hay. The yields from these plots were as follows:

Plot Number 1 — 2,200 lbs.	Plot Number 4 — 1,860 lbs.
Plot Number 2 — 2,000 lbs.	Plot Number 5 — 1,750 lbs.
Plot Number 3 — 1,780 lbs.	Plot Number 6 — 1,730 lbs.

This variation in yield was not as large last year as it has been on some of the other years when much greater variation took place. This was probably due a great deal to the season.

In order to have a complete soil analysis of these plots, samples were submitted to the Chemistry Department, O.A.C. The following table will serve to summarize the report which they submitted to us. This is rather interesting and shows some discrepencies which might be accounted for by

the lack of sufficient material in the samples submitted. It is rather interesting and consequently is reported below.

Plot	pH	% Organic Matter	% Total Nitrogen	C/N Ratio	Exchange Capacity m.e./100g	Calcium lbs. per ac.	Magnesium Lbs. per ac.	Phosphorus lbs. per ac,	Potassium lbs. per ac.	Water Soluble Aggregates % over 2 mm.
1	7.22	7.38	.37	11.5/1	28.4	11,544	558	248	194	9.5
2	7.27	5.14	.26	11.5/1	21.3	9,040	524	214	182	8.2
3	7.13	5.53	.30	10.5/1	23.8	9,920	660	204	176	6.4
4	7.15	4.96	.25	11.2/1	20.7	9,708	554	179	142	9.2
5	7.40	6.19	.34	10.6/1	23.8	9,836	640	240	172	5.6
6	7.18	7.02	.32	12.8/1	26.0	10,560	728	288	176	9.2
7	6.98	7.93	.36	12.8/1	28.4	10,764	800	276	170	25.5
8	7.02	7.22	.33	12.8/1	25.8	10,180	512	200	170	32.7

GENERAL CROPS

Soy Beans

Variety tests of soy beans were conducted as usual. The plots were situated on gravely loam and during part of the season they dried out fairly well and consequently the yields were not as reliable as they are sometimes for the simple reason that the later varieties were affected more by the dry weather than the early ones, and consequently does not indicate what they might do other seasons or on other types of land. For instance, the Lincoln usually are the highest yielders and are down fairly well on the list this year.

1. Munroe 29.3 bus.
2. H5 Special 27.8 bus.
3. O.A.C. 211 28 bus.
4. Mandarin 27.4 bus.
5. Earlyanna 26.1 bus.
6. Capital 26.6 bus.
7. Harley 26.3 bus.
8. Harmon 25.9 bus.
9. Lincoln 24.7 bus.
10. A.K. 24.5 bus.
11. Cabot 23.8 bus.
12. 129/29 23.6 bus.
13. Hawkeye 24 bus.
14. Harrow 81B 23.2 bus.
15. Richland 23 bus.

White Beans

During the season of 1949 White Bean variety tests were conducted on four different plots. One in Elgin, one in Middlesex and one in Huron besides the test at the Experimental Farm. In 1949 the variety which has been grown under a number for several years was licensed as the Clipper variety. This variety has done well throughout the bean district in recent years and is promising to be a variety that will be popular throughout the bean growing district. In the test this year several old varieties have been discarded. Five of the main varieties were tested as well as some new for seedlings from the Field Husbandry Branch at Ottawa. The following table will give the results from the plots at the Western Ontario Experimental Farm.

Clipper 33.16 bus.
Michelite 31.33 bus.
Corvet 30.33 bus.
Blue Pod 30.16 bus.
Robust 30 bus.

Canada 3409 28.33 bus.
Canada 3410 27.83 bus.
Canada 3412 27.5 bus.
Canada 3411 25.16 bus.

It can be readily seen that the last four beans which are new varieties did not show up as well as the five standard varieties at the beginning of the table.

The five standard varieties were tested on the outside plots. The following table will give a summary of the yields.

Huron	*Middlesex*	*Elgin*
Clipper 24.25	Corvet 35.5	Robust 31
Robust 19.50	Michelite 34	Clipper 30.7
Corvet 19.25	Clipper 31	Corvet 28.2
Blue Pod 18.5	Blue Pod 30	Michelite 27.5
Michelite 18.25	Robust 27	Blue Pod 26

Corn

Considerably more work is done with corn than with any other crop. Variety tests, cultural tests and spraying tests were conducted during the year. The variety test and work is carried on in co-operation with the Ontario Corn Committee. The results of these tests are not usually published but from them a list of suitable varieties for production throughout the Province is compiled. The following table will give the varieties of corn recommended by the committee for production in 1950.

Very Early	
Warwick	150
Wisconsin (Canada)	240
Jacques	802
Warwick	250
Wisconsin (Canada)	255
Kingscrost	KE1
Funks	G8
DeKalb	43
Wisconsin (Canada)	275
Funks	G42
Early	
Funks	G 35
DeKalb	56
Pioneer	359
Wisconsin (Canada)	355
Kingscrost	KA
Wisconsin (Canada)	416
DeKalb	65
Funks	G176
*DeKalb	305W
Pioneer	355
*Iowa	3215
Funks	G 10
Wisconsin (Canada)	531
Pride	B 45A
Medium	
Funks	G550W
King	300
DeKalb	240
Pfister	56
DeKalb	398W
Pioneer	353A
Reids	107W
Wisconsin (Canada)	606
Moews	85A
Pride	D56
Pfister	61
Pioneer	349
Wisconsin (Canada)	595
Wisconsin (Canada)	645
DeKalb	406
Funks	G30
Wisconsin (Canada)	641AA
Wisconsin (Canada)	625
Pfister	274
Pioneer	373
Funks	G 31
Pioneer	352
Jacques	1157
Late	
Pioneer	322
DeKalb	243
DeKalb	404A
Kingscrost	KT
Pfister	3897
Pride	D 66
Pioneer	342
*Lowe	6W
Wisconsin (Canada)	696
Wisconsin (Canada)	692
DeKalb	458
Pioneer	340
Funks	G 29
**Excelsior	
**Funks	G 77A

*White Hybrid.
**For Silage only.

The spraying of corn was continued in 1949. Our cleanest fields were obtained when corn had been cultivated once and then sprayed with one-half pound of 2,4-D per acre. This method seemed to be better than any of the pre-emergent sprays and much cleaner than when corn was cultivated three times in the season.

Shelled Corn Drying

For a number of years we have been drying seed corn on the cob and have two different types of corn driers for this purpose. In the fall of 1949 we had an occasion to dry some corn that had already been shelled. The corn was placed on a screen on the floor of our bin drier and spread six inches deep in one bin and twelve inches in the other. Moisture content on this corn was twenty percent. The temperature was maintained at around seventy-five degrees throughout. It required about twenty hours at this temperature to reduce the corn in both bins to thirteen percent moisture. Where the shelled corn was put deeper than this the results were not as satisfactory. A higher temperature would possibly have been more effective but this was not possible at the time the experiment was conducted.

Winter Wheat

We grow considerable acreage of wheat annually. Quite a percentage of it is sold as seed. For many years Dawson's 61 was the main variety. During the year this was replaced by two varieties of white winter wheat namely Dawbut and Cornel 595. Both of these varieties seem to do well here and are not subjected to loose smut as are some of the other varieties of wheat. In red wheat many varieties have been tried but of late years Ridgetown variety, a selection made from a field of red wheat some years ago, has replaced the others. This variety yields well but has not been considered suitable by the milling trade as it contains too much protein. It will probably be replaced by Fairfield, this has been the red variety which has stood up in the baking test conducted by the Ontario Wheat Committee. The following table will give you the yields of wheat in the plots in 1949.

Butler	38.5	2619A	30.2
2623A	32.7	Fairfield	30.8
104 x 101	34.8	Dawsons	33.9
Cornel	28.3	Vigo	31.6
O.A.C. 104 x 101	30.6	Blackhawk	29
		Willson	27.8

Sprays

In the season of 1949 alfalfa was dusted with three per cent D.D.T. dust. The dusting was done when the alfalfa was in full bloom. The dusted area yielded seventy-seven pounds and yielded sixty-three pounds of clean seed. The untreated area yielded one hundred and fifty-two pounds before cleaning and ninety-six pounds clean seed. It was interesting to note that the quality of the seed from the treated area was much superior to the untreated as well as giving a considerably larger yield. Taking it on an acre basis the area treated yielded thirty-nine pounds of clean seed per acre while the untreated yielded 20.3 pounds per acre.

Herbicides

During recent years considerable spraying of corn with 2,4-D to control weeds has been carried on. The results have always been pretty much the same. The corn sprayed when about six inches high showed the least damage from the spray and also gave better weed control. This work was continued in 1949 with very much the same results as in former years. The cleanest fields were obtained by spraying at six inches high and then not cultivated afterwards. The work in previous years had always been with field corn. During the season of 1949 an experiment was conducted with sweet corn as considerable inquiries were received in regard to this crop. Twenty-three varieties were tested.

Plan and Method

Twenty-three varieties of sweet corn were planted in hills 42 inches apart in parallel rows, two rows to a variety, in such numbers of hills that for each spray treatment six hills of a variety were sprayed and six hills were available for checks. This necessitated planting of 36 hills per row or 72 hills per two rows of each variety. Corn was planted with a hand planter with approximately four kernels per hill. The soil was a sandy loam. A 2-12-10 fertilizer at 150 pounds per acre was applied at planting time. Sodium Salt and Amine Salt at ½ pound per acre and Butyl Ester at ¼ pound per acre were applied separately on different lots of plots when corn was six inches, twelve inches and twenty-four inches. After planting no cultivation whatsoever was given.

The sprayer used was a mounted knapsack type equipped with bottle-tank, pressure gauge and spray boom seven feet long and with 1,020 nozzle orifices every twelve inches. Pressure with each application started at 35 pounds and in order to compensate for fall of pressure before bottle-tank was empty each spray was applied one-half in one direction and the other in the opposite direction. As the fine spray produced was from horizontal nozzles spaced a foot apart only one-half the spray applied actually fell on the corn plant rows, the other half falling on the ground between rows. This means that the amounts of 2,4-D used per acre were applied on the whole ground and actually only half the amounts fell on the corn plants.

Effect of Sprays on Corn Plants

There were four types of injury observable:

1. *Rolling and pointing of leaves* — This appeared on plants that were sprayed when six or twelve inches high and none on plants twenty-four inches high. Eventually the rolling and pointing disappeared and the plants assumed a normal appearance. The effect on yield is unknown but is doubtless small, if any.

2. *Leaning or bending of stalks less than thirty degrees* — This slight leaning appeared on many of the plants about ten days after spraying but plants eventually straightened up and no sign of leaning remained. There was no noticeable effect on yields although no yield data were compiled.

3. *Leaning at an angle greater than thirty degrees* — Most of these plants straightened somewhat so that when full grown but little leaning was discernable.

4. *Broken plants* — All plants that broke completely off at the base or were so effected at their bases that stalks lay within six inches of the ground.

Summary or Effects on Plants

Reference to detailed results shows rolling and pointing and leaning at less than a thirty degree angle to be the most common types of injury. This is followed by leaning at greater angle than thirty degrees; only twelve plants were broken. Since all plants affected by the first three types of injury recovered apparently completely or nearly so and their ears appeared to be equal in size to those in check plots it would seem safe to say that the crop was but little reduced by spraying.

Weed Control

Spraying gave excellent weed control especially when plants were sprayed at six inches height. Where this earliest spraying was carried out not only were most annuals killed and perennials checked, but no grasses grew due to

the pre-emergence effect on their seeds. A similar result was obtained on the seeds of wild buckwheat and smartweed, two weeds otherwise not destroyed by 2,4-D. These results were similar to those obtained on weed control in field corn in the work of two previous years.

Summary

1. Visual observations indicated that such slight damage as occurred was negligible compared to the benefits from weed control.

2. Spraying with ½ pound amounts of Sodium or Amine Salts or ¼ pound of Butyl Ester gave excellent weed control especially when spray was applied when corn was six inches high.

Spraying Oats

One of the worst weeds in this section in the oat crop is ragweed. By spraying with ¼ pound of 2,4-D per acre when the oats were 6 to 9 inches high controlled this weed. The oats had been seeded to red clover and no appreciable damage was noticed from this spray. The other section sprayed with different strengths of 2,4-D after oat harvest failed to give as good results as the earlier spray. Other weeds including Canada thistle were checked considerably by this spray.

Wheat

A section of the wheat field was also sprayed when the wheat was six to ten inches high. This spray was particularly effective in controlling false flax. Canada thistle, field bindweed and other weeds were kept in check considerably but the false flax was almost completely controlled without any effect on the red clover seed.

Considerable experimental work was done throughout the season on all kinds of brush and poison ivy. While a lot of damage was done to the brush and also the poison ivy complete results will not be known until these plots are carefully checked this year. In other years plots often showed considerable growth after having been pretty well wiped out in the fall of the year.

Milkweed has always been a plant that has been difficult to control by spraying. During the year a complete control was obtained on several lots of milkweed by using a .2% solution of 254T combined with a 2% solution of 2,4-D.

DEMONSTRATION FARM, NEW LISKEARD, ONTARIO

As the name implies, it has been our aim to keep the programme of farm operations as practical as possible, at the same time to build up and improve the soil, the crops, and the live stock. To this end it would appear that the work is progressing in the right direction so far as our soil improvement is concerned, as reports from the Soil Chemistry Division at the O.A.C. show that only one field required commercial fertilizer. The regular application of barnyard manure and the plowing down of clovers at the end of the rotation adds greatly to the physical condition of the soil in this clay belt. Most soil analysis reports show a lack of organic matter from other farms in the District, and it would appear that the method we are demonstrating, together with a suitable rotation, would be an economical method of soil building and soil conservation to carry out.

Registered seed is grown and distributed through the local farmers' co-operative. During the past few years the number of farmers growing registered seed has greatly increased. Most of the seed now grown came originally from the Demonstration Farm.

The season was not as favourable for crop production as the one previous. Seeding got under way about the normal time, and was interrupted by a cold wet spell of two or more weeks, from which the earlier seeding did not fully recover. This was followed by a continued dry spell that slowed up the growth of both the early and late seeding.

During the summer there was a severe outbreak of army worm, that did great damage to our oat and pasture fields. Large quantities of the recommended bran and paris green control mixture were applied in the evenings, which held them in check and permitted the harvest of at least a partial crop. Some farmers lost entire fields of grain and plowed them down in an endeavour to destroy the worms. This loss of crop has reflected greatly in the amount of feed and bedding that it has been necessary to purchase to carry stock through the winter.

An excellent crop of fine quality hay was harvested. This was mainly Alfalfa with a sprinkling of Red and Timothy. This harvested with a pick-up baler, which allowed us to get our crop inside. Part of the second crop was used to fill the silos and the balance used for pasture. We have been using this second cut as silage for quite a number of years. Nothing is added at the time of silo filling. It keeps well and is readily relished by the stock during the feeding season. Most years there is some carried over into the second winter.

Cartier, Ajax, and Beaver Oats have been giving the best returns through the past few years, and were the only ones used this year. Barboff Barley suits our purpose and gives a good return. Regent Wheat also does very well, and is grown for seed and feed. No Fall Wheat was seeded for this year's crop. A field of Rideau Fall Wheat was sown in the fall of 1949. This looked very promising when the snow came, but mild weather in January will likely be hard on most over-wintering crops.

Some field spraying has been done for the control of weeds, with very satisfactory results both in respect to control and cost.

LIVE STOCK

Cattle

Holstein and Shorthorn cattle are kept. Surplus breeding stock are disposed of locally. The herd is fully accredited and all calves are vaccinated. Both herd sires were changed during the year. The Holstein herd sire is A.B.C. Syl-

vius Lad—215424—, a line bred bull of the former herd sire Inka Supreme Reflection. Although this sire is young, he is a very fine individual and should prove a valuable addition to the herd. There is an exceptionally fine lot of heifer calves coming along from the old bull, which will make possible some selection work in our main herd. The new Shorthorn herd sire is O.A.C. Ransom 3 D—310649—, and is on loan from the O.A.C. The Holsteins are all on R.O.P. and the records of the cows that qualified are as follows:

Name	*From*	*To*	*Pounds of Milk*	*Fat Test*
Hillycrest Hartog Pluto	January, 1949	January, 1950	14,484.5	3.66%
College Governess	January, 1949	January, 1950	14,484.5	3.88%
Gertie College Perfection	February, 1949	December, 1949	10,212.5	4.34%
Canary Butter Girl	February, 1949	January, 1950	12,556.5	3.68%
Korndyke Bess Posch	March, 1949	January, 1950	11,548.5	3.77%
Ormsby Jeanette	March, 1949	January, 1950	11,223.5	3.60%
College Gaiety B	March, 1949	February, 1950	14,278.0	3.86%

Seven Holstein bull calves, five Shorthorn bull calves, and two Shorthorn heifers were sold at the Auction Sale in August.

Besides making available breeding stock to settlers, the two breeds are very useful for Junior Farmer judging and educational work.

Swine

The swine programme at the Farm has become pretty well routine. Five purebred Yorkshire brood sows are kept, and two litters are raised a year. Young boars are sold as required and are shipped pretty well all over this part of Ontario. Sows suitable for breeding purposes are sold at the Auction Sale in August. This sale attracts buyers from several outside districts. The remainder of the hogs are fed to market weight and shipped to the Toronto market. A very high percentage of these go as selects. With the exception of the sows the pigs are hopper fed. The sows have the run of an insulated building during the winter and are then in the open, being put in the farrowing pen ten days to two weeks before. With this dispersal of hogs going on for a number of years practically all the hogs in the District are related some way or another to the ones at the Farm, and the type of hogs kept has greatly improved as a result. There were thirteen Bred Sows, fifteen Open Sows, and six Boars sold at the Auction Sale last fall.

Sheep

Around 30 ewes are kept as well as a purebred Hampshire ram. A few purebred Hampshire ewes were purchased a few years ago, and the rams from these ewes are being sold for breeding purposes. The purebred Hampshire ewes are being retained to replace other ewes in the flock. Eventually we hope to have them all purebred Hampshires. Sheep do exceptionally well in the District and there is evidence of increase in the number of raisers, as well as the size of the flocks. The sheep winter in a straw shed, and are out as much as they wish all winter. The flock is treated for parasites twice a year and dipped once.

Poultry

The laying flock consists of around 350 to 400 barred rocks, which is the capacity of our pens. Each year around 1,500 chicks are hatched with our own incubator. These are brooded and ranged in colony houses on ground rotated every third year. The hens are disposed of in the late summer and the pens thoroughly cleaned and disinfected, and the pullets put in, in the fall as soon

as production has started. The balance of the pullets find a ready market with farmers requiring laying stock. There is usually a much greater demand than we have birds to sell. The birds are fed home-grown grain and the usual recommended commercial feeds, together with all the buttermilk they can drink the year round. The flock is under the Ontario Breeding Station supervision, and it has been some years now since we have had any losses from pullorum.

FIELD CROPS

Time of Maturity

Acres	*Variety*	*Date Sown*	*Days Harvested*	*Days to Maturity*
20	Reg. Cartier Oats	June 2 and 3	August 19	77
10	Reg. Beaver Oats	May 17	August 13	88
18	Reg. Ajax Oats	June 1	August 25	85
14	Barboff Barley	June 3	August 23	81
10	Regent Wheat	May 16	August 24	100

AGRICULTURAL AND HORTICULTURAL SOCIETIES BRANCH

AGRICULTURAL SOCIETIES

Fairs

Conditions generally were favourable for fairs in 1949. While there was more rain during the fall fair season, and 50% more fairs applied for Wet Weather grants, at a total of 35, farm work was well advanced, and in spite of the severe drought of some areas, conditions generally were good.

New attendance records were chalked up, and 61% of fairs had increased attendance.

Societies Highest in Attendance by Type of Fair

More than 2-pay days		*2-pay days*		*1-pay day*	
Canadian Lakehead	$23,172.00	Richmond	$8,000.00	Woodbridge	$5,836.00
Peterborough	$17,812.22	Owen Sound	$5,468.00	Teeswater	$5,680.00
Norfolk County	$13,580.00	Caledonia	$5,461.00	Erin	$4,929.80

The increase in number of exhibitors is most encouraging, as it was more marked than attendance. Over 74% of societies reported more exhibitors than in the previous year.

Juniors

Nearly 70% of all Junior Clubs organized in the Province were sponsored by agricultural societies. Two new kinds of clubs were promoted this year, the Tractor Maintenance and Forestry, included for the first time in the club policy. Calf Clubs continue to lead, as 159 of these were featured. The total membership in the 260 clubs sponsored by societies was over 4,000 boys and girls. Sixty-five societies co-operated in Girls' Home Garden Clubs, which included exhibits by over 500 girls, and covered fresh and canned vegetables and flowers. Some 420 girls participated in the Home-Making club programmes of A. and B. class fairs.

Breed Shows

Shows organized by breed organizations, and receiving grants from the Ontario Live Stock Branch, were again sponsored by, and became the main feature of many society fairs.

	County and Regional	*Championship*
Holstein-Friesian	38	4
Ayrshire	17	2
Jersey	19	2
Shorthorn	7	
Guernsey	9	-
Hereford	3	--
Yorkshire	6	1
Berkshire	1	1
Tamworth	1	1
Sheep	5	--

Commercial Features

Special grants equal to 50% of society expenditure, with a maximum grant of $200.00 were again offered. The main purposes were: 1. To interest more

prospective exhibitors among commercial producers; 2. To encourage "Show-window" displays of commercial products forming a major source of income in the area. Fifty grants were paid in support of this project. The following commercial products were chosen:

Feeder Cattle	7	Poultry and Eggs	7
Grain	3	Vegetables	3
Market Hogs	5	Milk and Dairy Products	1
Baby Beef	2	Farm Products (Jr.)	1
Horses	1	Potatoes	2
Market Lambs	1	Turnips	1
Fruit	5	Tobacco	1
Cheese	7	Honey	2

Grounds and Buildings

One hundred and twenty societies took action to improve their property indicated by the following:

Repairs and extensions to buildings	45
New fences	19
Levelling and grading of grounds	18
Hydro installation or extension	17
New stabling, barns and pens	16
New buildings such as, ticket office, secretaries' office, judges' stand, band stand	14
Grandstands and bleachers	13
Painting of buildings, fences, etc.	11
Installation of water system and toilets	11
Removal of stones, drainage and tree planting	8
Purchase of additional land	6
New equipment	6

Several Societies have taken advantage of grants available for Athletic Fields under the Community Centres Act. Grants are based on 25% of expenditure, and the maximum grant is $5,000. With several projects incompleted, the following Societies now hold their Fairs on grounds which have been placed under the Act for community purposes:

North Norwich	Armour, Ryerson and Burks Falls
Carrick (Mildmay)	Val Gagne
Teeswater	Brock (Sunderland)
Marmora	Huron Central (Clinton)
Dungannon	Aldborough (Rodney)
Beeton	Rocklyn
Kincardine	Exeter
Seaforth	Yarmouth and Belmont (Belmont)
Englehart	Providence Bay
Brighton	Wilmot (New Hamburg)
Bosanquet (Thedford)	Park Hill
Manitowaning	South Huron (Hensall)
Clifford	Machar (South River)
Mount Forest	Waterdown
Hanover	Streetsville
Clarksburg	Hensall
Dufferin Central (Shelburne)	Peel (Brampton)

Other Projects

Interest in field crop competitions was well maintained. 203 grants were paid as compared with 199 in 1949. This promoted the seeding of 21,000 bus. of registered grain and 18,000 bus. certified seed potatoes.

CANADIAN NATIONAL EXHIBITION—Agricultural Societies Class

Fifteen societies made entry and the first prize winners were:

Seed	*Sheaf*
Division 1 — Matheson	Division 1 — Magnetawan
Division 2 — Carp	Division 2 — No entries
Division 3 — Mitchell	Division 3 — Carrick

OTTAWA WINTER FAIR—Agricultural Societies Class

1 — Renfrew Agricultural Society, Renfrew
2 — Carleton Agricultural Society, Richmond
3 — Drummond Twp. Agricultural Society (Lanark County)
4 — North Lanark, Agricultural Society, Almonte.

Grants

Grants were paid as follows:

Regular Legislative grants	242
Indian Fairs	4
Maintenance Purebred Sires	9
Field Crop Competitions	203
Special Grants to Northern Societies	42
Commercial Production Features	50
Wet Weather grants	35
Centenary grants	1
No. societies getting lower grants due to races	24

COMMUNITY CENTRES ACT—1949

This Act replacing the Community Halls Act widened greatly the possibilities of grants by including skating arenas and making grants available to cities and towns. General prosperity and the offer of grants has stimulated action in all parts of the province to provide long desired athletic and recreational facilities. The processing of application and inspection of sites and construction has greatly increased the work of this branch in administering grants on community projects.

SKATING ARENAS

	Grant
Bracebridge	$ 5,000.00
Parry Sound	5,000.00
Providence Bay	4,500.00
Rocklyn	4,500.00
Keene	3,000.00
Thetford & Bosanquet	1,000.00
Cooper	2,500.00
Brighton	5,000.00
Cobalt	4,500.00
Fort Erie	5,000.00
Wiarton	4,500.00
Woodstock	5,000.00
Flesherton	5,000.00
Dunnville	4,500.00
Mindemoya	500.00
Campbellford	3,500.00
Newmarket	5,000.00
Almonte	3,500.00
Belgrave	3,729.00
Honeywood	4,500.00
Brooklin	2,500.00
Dryden	2,353.38
Woodville	1,500.00
Englehart	2,500.00
Mount Forest	5,000.00
Hastings	2,500.00
Sutton	2,000.00
Burks Falls	2,500.00
Sunderland	1,250.00
Gore Bay	4,500.00

Teeswater	500.00
Hespeler	5,000.00
Queensville	4,100.00
Bowmanville	5,000.00
Bancroft	2,500.00
Hensall	2,500.00
Sioux Lookout	2,500.00
Lakefield	5,000.00
Clifford	5,000.00
Shallow Lake	4,000.00
Manitowaning	2,500.00
Peterborough	4,500.00
Eganville	4,500.00
Marmora	500.00
Little Britain	500.00
South River	2,500.00
Grafton	4,500.00
Stamford	4,500.00
Plattsville	500.00
Warsaw	3,500.00
Paris	4,500.00
Cambray	4,500.00
West Lorne	5,000.00
Delhi	2,000.00
TOTAL — 54	$186,432.38

COMMUNITY HALLS

	Grant
South Gillies	700.00
Dunn's Valley	909.49
Reid's Corners	1,960.00
Formosa	3,000.00
Bruce Station	2,675.00
St. Catharines	5,000.00
Gorrie	2,000.00
Spencerville	5,000.00
Rosseau	424.00
Inglewood	283.00
Wabigoon	1,250.00
Portland	1,254.00
Holland Landing	2,000.00
Calabogie	1,060.00
Whitechurch	1,125.00
Silver Water	4,000.00
Bond Head	3,000.00
Lucknow	1,000.00
Avon	1,500.00
Val Gagne	2,500.00
Brigden	1,500.00
Brownsville	1,750.00
Port Lambton	1,500.00
Hudson	1,683.00
Actinolite	300.00
Dorchester	871.00
Denbigh	949.00
Marsville	1,528.00
Desbarats	1,750.00
Warkworth	2,500.00
Wallacetown	1,575.00
Oliver Road	3,700.00
Maxville	4,500.00
Sundridge	3,000.00
Lindsay Twp.	4,620.00
Hagersville	2,000.00
Fairbank	2,500.00
Clarksburg	1,300.00
TOTAL — 38	$ 78,166.49

SKATING ARENAS AND HALLS

	Grant
Capreol	$ 10,000.00
Ayr	6,500.00
Hearst	9,500.00
Minden	10,000.00
Keswick	4,000.00
Zurich	7,000.00
Mactier	5,000.00
New Hamburg	4,500.00
Alliston	8,000.00
Cobourg	5,000.00
Stayner	10,000.00
North Norwich	5,000.00
Parkhill	10,000.00
Paisley	7,500.00
Shelburne	8,833.00
Seaforth	10,000.00
Belmont	5,000.00
Beeton	7,500.00
Havelock	3,500.00
Mildmay	5,000.00
TOTAL — 20	$141,833.00

ATHLETIC FIELDS

	Grant
Mitchell	2,500.00
Pakenham	1,500.00
Culver Park (Kirkland Lake)	3,000.00
Listowel	5,000.00
Streetsville	2,500.00
Chesley	3,000.00
Waterdown	2,500.00
Halton	3,000.00
Frankford	700.00
West Lorne	2,500.00
Langton	1,000.00
Hanover	4,000.00
Dixie	1,408.00
Caledonia	1,000.00
Kincardine	2,000.00
Merritton	4,000.00
Mildmay	712,00
Fonthill	1,317.62
Clarksburg	200.00
Mount Hope (Glanford)	360.00
Manotick	1,000.00
Hawkesbury	2,500.00
Stoney Creek	655.00
Oshawa	5,000.00
Rodney	4,856.00

Marmora	1,500.00
Nobleton	2,000.00
Little Britain	250.00
Grafton	550.00
Clifford	2,716.00
Hensall	500.00
Queensville	900.00
TOTAL — 32	$ 64,624.62

OUT DOOR RINKS

	Grant
Micksburg	470.00
Fonthill	1,942.95
Callander	330.00
Northcote	1,200.00
TOTAL — 4	$ 3,942.95
GRAND TOTAL	$474,999.44

FARM IMPLEMENTS

As the supply of implements for most types was equal to demand, work in this field decreased during the year. The office continues to serve as a clearing house for information on this subject.

HORTICULTURAL SOCIETIES

In the year, seven new societies were organized, and after allowing for some which became inactive, there was a net gain of 10 in the number receiving grants. One half of the societies reported an increase in membership. The total membership for 1948 was 28,612, an increase of 2,587 over 1947.

High Membership by Classes, 1949

City		*Town*		*Village*		*Township*	
Waterloo	1,179	Orillia	455	Ayr	257	Scarboro	440
Chatham	1,011	Wallaceburg	385	Thornhill	252	Clover Leaf	311
Ottawa	1,007	Barrie	380	Port Elgin	172	Guelph	271
Kitchener	926	Bracebridge	334	Watford	167	Bertie	226
Guelph	800						

New Societies: — Gravenhurst, Deep River, Fort Erie, Espanola, Bruce Station, Merritton.

Grants were paid to 182 societies, and calculated as indicated. The rates were lower because of increased total membership and expenditure.

Members	1949	1948
On Horticultural Expenditure	15.1%	17.2%
	15.4c per member	16.5c

Society Activities

A study of society programmes reveals an improvement in rendering greater service. There was an increase in civic planting and more juvenile promotion. Civic Beautification 70% of Societies; Annual and Monthly shows 65%; Garden Competitions 35%; Juvenile Activities 70%. Other projects included — Clean Up Week, distribution of seeds, fertilizer and weed killer as well as leaflets and bulletins to members.

The average number of board meetings held by societies was five, and an average of three open meetings were held featuring illustrated and other addresses, films and demonstrations.

Stamford is congratulated on the establishment of the "Stamford Green Memorial Garden" and the impressive Memorial and Investiture Service, on Sunday August 7th, at which Col. the Hon. Ray Lawson, Lieut. Governor of Ontario officiated.

Winners Society Classes, C.N.E.

Class 247 — Section — Basket of Flowers:

	August 29th	*Sept. 1st*
1st	Stouffville	North Toronto
2nd	Roselands	Stouffville
3rd	North Toronto	
4th	Thornhill	
	Sept. 5th	*Sept. 8th*
1st	Stouffville	North Toronto
2nd	North Toronto	Stouffville

Society Anniversaries

Hamilton is this year celebrating a centenary anniversary. Unfortunately the official reports do not go back for 100 years, but the year book of 1863 includes Hamilton as active at that time.

Elmira had a banquet celebrating the 51st anniversary. One charter member was present.

Guelph held a dinner on February 28th celebrating the 50th anniversary but it is believed this society was active before the turn of the century.

The following societies are at least 25 years of age:

Timmins	Pembroke	Kincardine
East York	Arthur	Tara
Stouffville	Parry Sound	Lucknow
Scarboro	Erin	North York
		Oro Twp.

THE ONTARIO HORTICULTURAL ASSOCIATION

The Annual Convention was held in Hamilton early in March with an excellent attendance of delegates. In addition meetings were held in all O.H.A. Districts except No. 12 and 14, which covers the large area west of the Great Lakes. The largest attendance was in No. 5 with 19 societies represented, and total delegates 300. The percentage of societies represented is a fair comparison and in this No. 13 was in 1st place with only one society not represented.

Association Awards

An O.H.A. Silver Medal and Diploma was awarded to Mr. Kirk Howard of Kingston. Each school winning a 1st prize in an Association Improvement Competition was awarded a diploma.

School Ground Improvement Competition

366 entries in local
11 entries in Provincial

Prize Winners Provincial

1—S.S. No. 5, Wainfleet, Welland
2—S.S. No. 3, Proton, Grey
3—S.S. No. 2 Derby, Grey
4—S.S. No. 9 Elderslie, Bruce

Certificates provided by the O.H.A. were presented at schools selected by School Inspectors for having the best kept grounds in their respective townships.

School Forestry Competition Prize Winners

230 entries in zone competitions, an increase of 98 over 1948.

Provincial Winners

	District	*Local Entries*
1. S.S. No. 12 Haldimand, Northumberland	4	5
2. S.S. No. 11 Woolwich, Waterloo	2	145
3. North Walsingham Public School, Norfolk	1	7
4. S.S. No. 2 Faraday, Hastings	5	61
5. S.S. No. 10 Roseville, Ontario	3	6
6. Athens Public School, Leeds	6	6

Jackman Windbreak Competition

This new feature initiated in 1947, and for which substantial prizes were offered by A. J. Jackman, District Director No. 8, had 12 entries in the counties of Bruce and Grey. The 1st prize of $50 was won by Laverne Hewitson, Owen Sound.

Wild Flower Essay Competition

There were 18 competitions, with 542 entries, compared with 160 in 1948. Interest was thus aroused in areas as widely reported as the Ottawa Valley and Rainy River.

British Fund:

The third shipment of parcels was forwarded to Gardener pensioners in England in March, and 200 letters of appreciation were received by the secretary.

Summary

Shipment 1 — August, 1947 — 876 lbs.	$293.40
Shipment 2 — June, 1948 — 225 parcels	380.76
Shipment 3 — March, 1949 — 221 parcels	338.74

Expressing thanks for previous co-operation, and reporting that Maple seedlings in Britain were doing well, the Imperial War Graves Commission asked assistance in planting stock for cemeteries in France containing graves of Canadian personnel. By kindness of Ontario Department of Lands and Forests, 1,200 maple seedlings are going forward now. Experimental Farm, Indian Head, Saskatchewan, provided Caragana Seed for hedges.

Society Services

The Association provided Service Diplomas for 36 societies, record books for eight. The association also made available the use of a projector and set of slides. They were used by 14 societies.

Judges

All Northern Fairs and societies holding field crop competitions were provided with judges by this branch.

ONTARIO ASSOCIATION OF AGRICULTURAL SOCIETIES

District Meetings were held in each of the 15 Association Districts. The district director in each instance with the help of his committee arranged the program. In addition to the usual discussion on Society and Fair problems, dates of fairs in the district are agreed on and confirmed at these meetings.

The annual convention was held in Toronto in February and was well attended. The women's division set a record with 285 delegates enrolled.

During the year the Association, like other Provincial organizations, presented a brief to the Select Committee of the Legislature on conservation. The brief included the following summary:—

"We recommend the promotion of a definite program of 'Land Improvement', a major part of which should be every encouragement to 'Animal Agriculture', or live stock farming. To improve land, and thus conserve it, demands the best of husbandry and this Agricultural Societies have promoted through a long past and propose to encourage in the future.

"We urge that special attention be given to the organic content of soils, and to the water conservation possibilities of thicker stands of grasses and clovers. We recommend that more attention be given to the protection and development of wood-lots.

"You are assured of the active support of Agricultural Societies in any sound conservation policies which may be adopted for this Province."

Service diplomas were supplied to 57 societies and 78 metal field signs were sold.

The Association was admitted to membership in the Canadian Association of Fairs and Exhibitions and was represented at the annual meeting of that organization by the secretary.

The annual meeting of the International Association of Fairs and Exhibitions held in Chicago in December was also attended by the secretary. An important step was taken there in forming a separate section for State and Provincial Associations.

J. Lockie Wilson Memorial Trophy

The second award of this trophy made possible by several associations with which late Mr. Wilson was associated was presented at the Ontario Agricultural College to the Ontario Veterinary College debating team, all members of the senior year.

E. T. Banting J. A. Carman C. F. Campbell A. J. Scott

ONTARIO PLOWMEN'S ASSOCIATION

International Plowing Match

At the 1949 match in Brant County despite a rule restricting entries, the record of 1948 was broken by an increase of 250. Of the 1,178 entries 934 were in tractor classes. A record was also established by an estimated attendance of 200,000. This was due to the central location, the enthusiasm of the Brant Committee and wide-spread interest in match plowing.

The tented city included 137 exhibitors, 70 restaurants and a total street frontage of 8,675 feet.

Educational exhibits and demonstrations were provided by Dominion and Provincial Governments, Ontario Hydro Electric Power Commission, Ontario Fire Marshall's Department and other agencies. A tractor driving competition for junior farmers was a new feature.

Entries	*Horses*	*Tractors*	*Total*
Oct. 11	41	126	167
Oct. 13	74	319	393
Oct. 14	59	298	357
Oct. 15	70	191	261
	244	934	1,178

Prize money including value of trips totalled over $12,000.00.

Winners of Special Classes

Trans-Atlantic Class — horses — Imperial Oil Ltd.
Gold Medalist — Ronald Marquis, Sunderland.
Silver Medalist — N. Jarvis, Markham.

Trans-Atlantic Class — tractors — Imperial Oil Ltd.
Gold Medalist — James Eccles, Brampton.
Silver Medalist — Douglas Campbell, Cainsville.

Inter-County Competition — horses — Salada Tea Co. of Canada Ltd.
Conservation tour in the United States.

1st. Haldimand County
Coach — Agricultural Representative A. G. Skinner.
Team Members — Earl Bacher, Cayuga
Robert Nixon, Hagersville.

2nd. York County
Coach — Agricultural Representative W. M. Cockburn.
Team Members — Eugene Timbers, Milliken
Norman Watson, Woodbridge.
High Contestant — Eugene Timbers, Milliken.

Inter-County Competition — tractors — British American Oil Co.
Trip to Chicago.

County — Haldimand.
Coach — A. G. Skinner, Agricultural Representative.
Team Members — Earl Fleming, Hagersville
William Waldbrook, Hagersville.
High Contestant — William Waldbrook, Hagersville,

Fred G. Fuller Trophy.

Branch Activities

Events	*1948*	*1949*	*Change*
Senior Match	68	70	2
Junior Match	7	15	8
Home Plowing	5	4	--
Demonstrations	15	31	--

Senior Match Entries

Tractors	1,003	1,518	513
Horses	738	831	93
TOTAL	1,741	2,349	608

These tables reflect a sharp upward trend in Match Plowing interest and activity. Attractive International and Local prize lists, and the new rule requiring prospective competitors at the big match to have plowed at Branch Matches were contributing factors.

Departmental judges and demonstrators were supplied for practically all events.

Trip to Britain

Two top plowmen, Ronald Marquis of Sunderland and James Eccles of Brampton, winners in the Trans-Atlantic classes at the International, were privileged to tour the British Isles from January 10 to February 19, 1950, under the guidance of a past president of the Association, Alex McKinney, Jr. of Brampton. While there the party took time to visit Denmark, Holland and

West Germany, where a study was made of farming methods common to those continental countries.

At the plowing match held at Newquay in South England James Eccles won 3rd and Ronald Marquis 5th. They also participated in the Irish International Match at Mullusk, near Belfast. Using a high cut plow with only one day's practice Mr. Eccles placed 8th in a field of 38 champion plowmen. In a special class for overseas plowmen and with stiff competition from Europeans, James Eccles was first and Ronald Marquis second.

Conservation

The Association took advantage of the opportunity to present a brief to select Committee of the Provincial Legislature on Conservation. This covered the contribution made by plowmen and some definite recommendations on soil cultivation and machinery. The brief emphasized the importance of efficient plowing and proper cultivation in any conservation program.

AGRICULTURAL REPRESENTATIVE BRANCH

FOREWORD

The area of Central Ontario experienced a very severe drought period during the early summer of 1949, resulting in very light crops of hay and spring sown cereal grains. The drought period extended into Eastern Ontario later in the season, cutting crop yields somewhat, while the Western Counties experienced more favourable growing conditions and harvested good crops, particularly of winter wheat, soybeans and tobacco. In the Northern Districts of the Province, crop yields were variable with considerable loss occurring in localized areas from damage by Army Worm and Grasshoppers.

In summarizing the work of the Agricultural Representatives in the Counties and Districts across Ontario, one is impressed with the fact that farmers are considering conservation in its broader aspect as something which directly affects their future well being. This is reflected in the general programme of extension work carried on in most Counties and Districts. Some twenty Counties have inaugurated definite soil improvement and land use projects and programmes embracing such items as drainage, water supply, erosion control, soil fertility build up, application of agricultural limestone, reforestation, etc.

A general programme of live stock improvement has been carried on during the past year, concentrating on animal health through the control of disease and parasites, use of good sires, an expanding artificial breeding programme and correct marketing practices.

The development of Junior Farmer activities and Boys' and Girls' Club Work has taken considerable time of the Agricultural Representatives and Assistants, and occupies an important place in the general agricultural development of every community where organized.

The demand of the farm people for the services of the Agricultural Extension Worker are many and varied, necessitating his attending many meetings to assist in formulating plans for and carrying out various Agricultural Policies within his County or District.

PERSONNEL CHANGES AND APPOINTMENTS

RETIREMENTS ON SUPERANNUATION

A. W. Sirett, retired June 1, 1949 — with Representative Service from October, 1913 — Representative in Frontenac County 33½ years. Living in Portsmouth.

F. C. McRae, resigned due to ill health May 1, 1949. In service 37 years. Served in Parry Sound District, Bruce, Peterborough, Glengarry Counties and Nipissing District.

E. F. Neff, retired September 5, 1949. In service 34 years. Representative in Norfolk County 5 years, Leeds 5 years and Lincoln 23 years.

New Office Opened — Russell County at Rockland, December, 1949.

PROMOTIONS

Raoul Portelance — from Assistant Agricultural Representative, Cochrane West, to Agricultural Representative, Cochrane West, July 1, 1949, and as Agricultural Representative, Cochrane North and West from December 1, 1949.

D. H. Miles — promoted from Assistant Agricultural Representative, Frontenac County, to Agricultural Representative, Frontenac County, June 1, 1949.

G. W. Montgomery — promoted from Assistant Agricultural Representative, Hastings County, to Agricultural Representative, Nipissing District, June 1, 1949.

G. E. Nelson — promoted from Assistant Agricultural Representative, Lincoln County, to Agricultural Representative, Lincoln County, September 1, 1949.

A. G. Mitchell — promoted from Assistant Agricultural Representative, Lambton County, to Agricultural Representative, Muskoka and Parry Sound District, January 1, 1950.

TRANSFERS — Agricultural Representatives

D. N. Graham — from Muskoka and Parry Sound District to Brant County, January 1, 1950.

W. A. Montcalm — from Cochrane North, to Russell County, November 1, 1949.

NEW APPOINTMENTS

W. D. Tipper — Assistant Agricultural Representative, Bruce County, June 1, 1949.

D. M. Adams — Assistant Agricultural Representative, Carleton County, June 1, 1949.

W. D. Clutton — Assistant Agricultural Representative, Wentworth County, June 1, 1949.

G. W. Sweiger — Assistant Agricultural Representative, Grey County, June 1, 1949.

F. O. Wilson — Assistant Agricultural Representative, Huron County, June 1, 1949.

K. E. Best — Assistant Agricultural Representative, Oxford County, June 1, 1949.

R. E. Bell — Assistant Agricultural Representative, Peterborough County, June 1, 1949.

F. J. G. Millette — Assistant Agricultural Representative, Prescott County, June 1, 1949.

E. A. Starr — Assistant Agricultural Representative, Renfrew County, June 1, 1949.

J. A. Hancock — Assistant Agricultural Representative, North Simcoe County, June 1, 1949.

W. D. Black — Assistant Agricultural Representative, Wellington County, June 1, 1949.

J. W. McCullough — Assistant Agricultural Representative, York County, June 1, 1949.

W. T. Abraham — Assistant Agricultural Representative, Middlesex County, August 1, 1949.

J. A. Francis — Assistant Agricultural Representative South Simcoe County, March 1, 1950.

R. D. Sanderson — Fieldman, Fruit and Vegetables, Oakville, Ontario, June 1, 1949.

R. G. Gregg — Fieldman, Agricultural Engineering Department, Guelph, Ontario, February 1, 1950.

RESIGNATIONS

D. W. MacMillan, Assistant Agricultural Representative, Brant County, November 30, 1949 — Cockshutt Plow Company.

J. L. McQuay — Agricultural Representative, Brant County, December 31, 1949 — Farming Roslyn Park Farm, Galt.

A. R. Wilson, Assistant Agricultural Representative, Ontario County, February 28, 1950 — Veterans Land Act.

W. J. Knapp, Assistant Agricultural Representative, Perth County, March 31, 1950 — Farming at Galt, Ontario.

LEAVE OF ABSENCE

E. M. Biggs — awarded Rotary Foundation Fellowship — post-graduate work Wye College, University of London, England, September 1949-September 1950.

DEATHS

Miss Josephine Robinson — died November 9, 1949 — Stenographer in Oxford County office continuously from July 1st, 1913.

William Wilson, Clerk in Head Office — died March 9, 1950 — 27 years' service.

ADMINISTRATION

In December, 1949, a new office was opened at Rockland for Russell County. This now makes a total of fifty-five County and District offices in the Agricultural Representative Branch. The administrative duties of Head Office include the supervision of the offices as well as that of the New Liskeard Demonstration Farm, and purchase of supplies and equipment for same, inspection visits to offices, supervision of leases, allocation and changes of personnel, organization of annual and regional conferences and committees, arrangements for short course staff and itineraries, auditing Agricultural Representative Appropriation and County Grant Acts, serving on committees and boards, speaking engagements, supervision of emergency surveys and reports, assistance in distribution of emergency farm labour, the issuing of weekly crop reports and the purchase and maintenance of cars and equipment, administration of special grants for land use and soil improvement projects.

In the field of Junior activities, Head Office has been responsible for assisting in formulating and carrying out Junior Farmer projects, managing competitions at larger fairs, supervision of Boys' and Girls' Club Work, including preparation of forms, policies, manuals, organization and management of the Provincial Inter-Club Competitions and co-operating with the Canadian Council on Boys' and Girls' Club Work in holding National Contests.

Supervision of the work of two Fruit and Vegetable Fieldmen also comes under the administrative duties of this office.

EXTENSION WORK IN COUNTIES AND DISTRICTS

LIVE STOCK IMPROVEMENT

Horses

Localized areas in the Province of Ontario report higher prices paid for good commercial horses of both draught and light breeds. The Ontario Pure Bred Foal Policy, put into effect in 1949, resulted in renewed interest in the breeding of better quality mares to the better stallions available. The Agricultural Representative Service assisted in the inspection of both stallions and mares by driving the inspector appointed under the Stallion Enrollment Act on inspection tours in Counties and Districts.

Cattle

In practically every County or District a programme of cattle improvement has been one of the more important phases of work of the respective Agricultural Representatives during the past year.

Some 14 Counties or Districts have been in the process of receiving the first T.B. area test for the eradication of Tuberculosis in cattle. Thirty-six other Counties or Districts have either been tested or are in the process of being tested in subsequent general retests. In all, some 50 Counties or Districts in Ontario are under a definite plan of area testing of cattle for the eradication of T.B. The Agricultural Representatives have assisted in organizing this programme in their respective areas.

During the past year the Agricultural Representatives assisted some 22 Counties or Districts in promoting an organized programme of Calfhood Vaccination for the control of Brucellosis in cattle. Some 44,650 calves were vaccinated within the scope of their programmes, with several thousand additional head vaccinated by owners in localized areas in other counties.

Thirty Dairy Herd Improvement Associations, comprising 793 herds and 12,499 cows, were in operation during the year. The Agricultural Representatives lined up the members for these Associations and assisted in completing their organization. The testing for production in herds through the Dairy Herd Improvement Association has drawn very great interest among grade dairy herd owners. The expansion of Artificial Breeding Units, coupled with a production testing programme, will undoubtedly result in improvement of commercial dairy herds. The Artificial Breeding Programme made progress during the year with 6,971 herd owners as members in the 60 local and central units established in the Province. Some 88,737 cows were bred artificially during the year in these organized units, with additional numbers bred through units operating under private enterprise. The Agricultural Representatives attend annual and other meetings of the A. I. Units and are called upon to assist in organizing new units and enrolling members, and in many cases, are members of the Herd Sire Purchasing Committees.

Warble Fly control work was carried on extensively in the counties considered to be the chief beef cattle producing areas. In all, some 17 Counties or Districts through local organization treated some 325,000 head of cattle for Warble control, either by hand-brush or spray method. Many thousands of animals were treated in addition by individual farmers. The Agricultural Representative was called upon to organize these campaigns in co-operation with local municipal officials and others interested in such a programme.

Maintaining those already in existence and the organization of new ones has brought the number of Bull Clubs under the Federal Bull Loaning Policy

up to 166 Clubs with a membership of 926. Manitoulin Island and the District of Algoma with 49 and 42 clubs respectively are making excellent use of the policy to improve their cattle herds. This is reflected in the general improvement of the offering of cattle presented at the Feeder Cattle Sale in Manitoulin each year. Preliminary organization work has been completed for a second Feeder Cattle Sale in the Algoma District in 1950. The Agricultural Representatives assist in placing these bulls and in organizing and conducting these cattle sales. In all, Agricultural Representatives assisted in conducting ten special cattle sales involving 3,270 head, selling for $536,218.

Nine subsidized veterinary units operated in Northern Ontario Districts during the past fiscal year. These were organized by the Agricultural Representatives and provided excellent service for the farmers concerned. Approximately 7,000 calls were made by the veterinarians employed in the areas concerned.

Over 1,500 exhibitors brought out 8,291 cattle to County or District breed shows sponsored by local breed organizations. Agricultural Representatives assisted in selecting entries for these shows, compiling catalogues of entries and in conducting the shows and regard such shows as excellent contacts for cattle improvement with the smaller breeder particularly.

Prices for both beef and dairy cattle have remained at a high level during the year and cattlemen generally have been anxious to take advantage of all facilities to improve their herds. The excellent sale of bulls of the beef breeds held in March, 1950, is ample evidence of this fact.

Swine

Forty-eight farmers with 262 sows continued to co-operate in the Demonstration Hog Production Policy. Agricultural Representatives made use of the information secured through these cost studies at 55 special swine meetings, bacon shows and demonstrations throughout the year. Twenty-three new Boar Clubs were organized during the year by the Agricultural Representatives, making a total of 85 in operation in the Province, with 969 members. The Agricultural Representatives continued to conduct quarterly pig surveys collecting information re trends in Swine production. Bacon shows, field days and organized tours to packing plants have been utilized by Agricultural Representatives to give hog producers first hand information on production, marketing and processing of the hogs which they produce.

Sheep

With the exception of certain parts of Northern Ontario, Agricultural Representatives report the continued decline of the sheep population. One hundred and ninety Rams were placed in the Northern Ontario Districts and the Agricultural Representative in the Temiskaming District reports increased interest on the part of farmers in sheep production in that area. A few localized areas in Southern Ontario report a trend to larger sheep flocks which can be more adequately protected against destruction by predatory animals. Over 4,000 head of sheep and lambs were reported destroyed by dogs, wolves, bears, etc. during the past year. This has resulted in many small flock owners going out of sheep production. Eighteen demonstrations on the treating of sheep for internal and external parasites were conducted by the Agricultural Representatives and eight Lamb Fairs or co-operative shipments organized where lambs were marketed on carcass or live grade basis.

Poultry

During 1949 poultry production continued at a high level. Shortly before the expiration of the contract for eggs for shipment to United Kingdom, prices

dropped sharply and subsequently there was a substantial liquidation of poultry flocks. Hatcherymen report a 25% to 50% reduction in the sale of baby chicks for 1950. Agricultural Representatives conducted 45 poultry culling demonstrations and 38 special poultry meetings during the year. Eleven hundred and sixty-nine flocks with 669,089 birds were entered in the Ontario Breeding Station Policy. Several large Turkey flocks were also entered in the policy as turkey production continued to expand in certain areas in the Province.

Agricultural Representatives continued to give service to hundreds of smaller flock owners on production and disease problems.

SOILS AND CROPS

Soil and Crop projects and problems continued to occupy a great deal of the time and energy of the Agricultural Representative Service during the past year:

	Number		*Attendance*
Hall Meetings	256		20,442
Field Meetings	69		19,174
Field Crop Tours	26		1,452
Other types of Meetings and Demonstrations	63		21,482
Test Plots	1,230		------
Maximum Yield Competitions	62	Competitors	1,165
Soil Samples sent away for testing	9,621		------
Nitro Cultures Distributed	5,738		------
Seed Fairs and Displays	46	Exhibits	3,633
Weed Control Demonstrations	93		2,601
Weed Control Meetings	59		1,618
Soil Improvement and Land Use Projects	24	Acreage Involved	11,048
Permits received for freight subsidy on Agricultural Limestone	38,411	Tons—48% increase over 1948	

The County or District Crop Improvement Associations act as the sponsors of many of the above listed projects but the Agricultural Representative as Secretary of these respective organizations does a large share of the work in arranging for and carrying out the programme undertaken.

There are a few items which stand out as being indicative of the trend on the part of farmers to pay more attention to soil fertility and land use. First, the very great increase — over 115% — in the number of soil samples taken for testing and the 48% increase in the amount of permits received by the Agricultural Representative for subsidy on freight for Agricultural Limestone. The distribution of cultures for use on legume crops also showed an increase of 41% over 1948-49. The development of 24 Soil Improvement and Land Use Projects along the lines of drainage work, control of erosion by laying down grassed waterways, contour cultivation, grassing steep slopes, etc. indicates farmer interest and participation in a program of soil conservation and fertility build up. Special events such as Grassland, Wheatland, Drainage and Soil Conservation Days were particularly well attended by farmers with the Agricultural Representative acting as Secretary-Manager of such events. Over 50 farms were operated according to plans submitted by Soil Specialists of the O.A.C. and 16 operated on the contour to control soil erosion. Approximately 35,000 acres were drained as a result of surveys made by the Drainage Department of the Ontario Agricultural College and the Kemptville Agricultural School with the Agricultural Representatives making an additional 141 surveys for drainage projects. The severe drought period during the summer of 1949 resulted in 25% to 50% of the farmers in Central Ontario area having insufficient water available from wells and other sources for live stock and household needs. Agri-

cultural Representatives report some 1,823 dugouts in use by farmers in the Province as a means of maintaining a reserve water supply.

Five thousand, five hundred and fifteen orchard owners received an average of 12 letters each, advising when and with what material to spray to control disease and insect pests in their orchards. The Agricultural Representative acted as Secretary and Manager at the sixty-five Senior Plowing Matches, with 2,259 entries, held in Ontario in 1949. Fifteen Junior Plowing Matches and Home Plowing Competitions, with 175 entries, were also conducted in various Counties and Districts.

At the International Plowing Match held in Brant County in 1949, 31 teams of two young men in each team were entered in the Inter-County Competitions, 10 in the horse-drawn class, and 21 in the tractor plow class.

Horse-Drawn Class—Winner—Haldimand County

Team Members—Robert Nixon, Hagersville, No. 5
Earl Bacher, Cayuga, No. 3

Coach—A. G. Skinner, B.S.A.,
Agricultural Representative,
Cayuga, Ontario.

Tractor Class— Winner—Haldimand County

Team Members—Wm. Waldbrook, Hagersville
Earl Fleming, Hagersville, No. 5.

Coach—A. G. Skinner, B.S.A.,
Agricultural Representative,
Cayuga, Ontario.

In the Districts in Northern Ontario the Agricultural Representatives advise farmers of the assistance offered in land clearing, breaking and ditching and receive applications for same, co-operating with the Commissioner of Northern Development.

CO-OPERATIVES

Farmers' co-operatives continued to do a large volume of business in the sale of farm produce and the purchase of farm supplies in practically every County and District in Ontario. In Grey County, for example, some 19 Co-operative organizations, representing over 3,000 members, handled over 5½ million dollars worth of business during the year. The volume of business handled by Farmers' Co-operatives in the Province in 1949, exceeded 40 million dollars. Agricultural Representatives are consulted frequently in an advisory capacity in setting up these organizations and developing their programs.

REFORESTATION

Agricultural Representatives assisted in organizing several Forestry Field Days and special Forestry projects. Over 80,000 acres in municipal forests include some 9,000 acres added during the past year. Reforestation of waste land and the conservation of existing woodlots is receiving attention in every County in Old Ontario and also in some Districts of Northern Ontario.

FARM LABOUR

The demand for farm labour was noticeably light in some parts of the Province during the year, particularly in Central Ontario where the dry season

cut down crop production considerably. Agricultural Representatives worked in close co-operation with National Employment officers in the placement of farm labour. Seasonal farm workers from Western Canada and the Maritimes and the placement of Displaced Persons, Dutch people, and other nationalities assisted greatly in taking care of the demand for farm workers.

JUNIOR DEVELOPMENT

Work with boys and girls, young men and young women in rural Ontario progressed splendidly during the year, through the medium of the Boys' and Girls' Club Projects and Junior Farmers' Associations. The development of leadership among the various groups has been given prominence in Junior Work during the year. To that end, four Boys' and Girls' Club Leaders conferences were held during the year with 335 active Local Club Leaders in attendance. Five Officers Training Schools were conducted for Junior Farmer Association officers in County and Local Junior Farmer Clubs.

Rural School Fairs

Ninety-one Rural School Fairs were held with 622 schools taking part, 49,161 entries, and some 85,900 people — children and adults — attending these School Fairs.

Agricultural Representatives continue to assist in the organizing of these School Fairs, in drawing up prize lists and carrying out the program of judging on School Fair Day.

Boys' and Girls' Club Work

The Department of Agriculture takes full responsibility for the organization and management of Club Work in Ontario, pays one-third of all prize money, and grants the Canadian Council on Boys' and Girls' Club Work an annual sum of $3,300.00.

Club Work in the counties is organized by the Agricultural Representative, or in the case of Homemaking Clubs, by the Home Economist.

Clubs Organized in 1949

	No. Clubs	*Membership*
Calf	198	3,157
Swine	32	434
Foal	1	22
Poultry	17	296
Grain	56	900
Potato	60	984
Tractor Maintenance	10	205
Farm Forestry	12	215
Girls' Home Garden Clubs	239	1,771
" Food Clubs	139	823
" Clothing Clubs	199	1,032
" Housefurnishing Clubs	72	481
" Hospitality Clubs	107	709
" Defence Clubs	73	472
TOTAL	1,215	11,501

Two new Club projects were added in 1949 — the Boys' Tractor Maintenance Club project and the Boys' and Girls' Farm Forestry project. In the Tractor project, the number of Clubs was limited to ten for the first year.

Provincial Inter-Club Competitions

The Inter-Club Competitions for Provincial honours were held at the Ontario Agricultural College, Guelph, on October 21st, with 330 boys and girls in 165 teams taking part.

Project	*Teams Competing*	*Winning Team Members*	*County*	*Coach*
Dairy Calf	45	Merlin Wilson, Merrickville Bill Armstrong, Spencerville No. 4	Grenville	C. C. Tennant
Beef Calf	28	Donald Taylor, Enniskillen No. 1 Glenn Larmer, Nestleton No. 2	Durham	E. A. Summers
Swine	15	Donald Prescott, Burketon No. 1 Howard Trewin, Burketon No. 1	Durham	E. A. Summers
Poultry	7	Robt. Campbell, Iona Station No. 1 Marjorie Carroll, Iona Station No. 1	Elgin	A. V. Langton D. A. McArthur
Grain	33	Chas. Bannister, Ailsa Craig No. 1 Jack McLaughlin, Ailsa Craig No. 1	Middlesex	W. K. Riddell W. T. Abraham
Potato	18	Elliott Dunbar, Pt. Hope No. 1 Lloyd Martin, Newcastle No. 3	Durham	E. A. Summers
Food	6	Jean McLean, Manotick Coral Scharf, Manotick	Carleton	Mrs. G. Hayes
Clothing	13	Annie Campbell, Iona Station No. 1 Tena Campbell, Iona Station No. 1	Elgin	Miss D. Kelly

National Club Contests

The winners of the various projects in the Provincial Inter-Club Competitions went on to compete in the National Contests and the Ontario teams placed as follows:

Dairy Cattle	1st
Beef Cattle	2nd
Swine	1st
Potato	2nd
Grain	2nd
Clothing	2nd
Food	2nd

Seed Judging Competitions

Inter-County Judging Competitions were held in connection with the Ottawa Valley and Quinte Seed Shows.

Quinte —Winner—Durham County
Coach—E. A. Summers

Ottawa Valley—Winner—Renfrew County
Coach—F. Q. Dench
E. A. Starr

Junior Fairs

The Ottawa Winter Fair, through financial assistance granted by the Dominion Department of Agriculture and the Ontario Department of Agriculture, staged the Eastern Ontario Boys' and Girls' Championship Calf and Swine Club Show, at Lansdowne Park, Ottawa, on October 28th, 1949.

In connection with the Lakehead Exhibition, a three-day Kiwanis Club Camp was held, sponsored by the Kiwanis Club. 103 members attended and there were 246 entries. The Canadian Lakehead Exhibition offered a scholarship to one boy and one girl, to attend the Short Course at the Ontario Agri-

cultural College. Miss Madeline Cech and Mr. Donald Vaillant won the scholarships, and attended the one-month's Short Course at the Ontario Agricultural College in January.

All counties from Frontenac and East exhibited. Carleton County topped the list with 66 entries, and Renfrew County second with 60.

List of Entries at Ottawa:

Holstein calves	137
Ayrshire calves	58
Jersey calves	22
Guernsey calves	2
Shorthorn calves	12
Hereford calves	2
Baby Beef calves	19
Swine	12

Central Canada Exhibition — Junior Section

Inter-Club Live Stock Judging Competion. There were 70 teams of three members each, making a total of 210 Club members competing on August 23rd, 1949

Winning Team	*Team*	*Coach*
Prescott Poultry Club	Mary Dennett, Algonquin James Edwards, Algonquin Donald Thorpe, Spencerville No. 4	C. C. Tennant

A Boys' and Girls' Club Camp was held in connection with this competition. Camp members spent a day at the Experimental Farm, were entertained at a theatre party and taken on sight-seeing tour around Ottawa. During the three days of the camp they were guests of the Central Canada Exhibition. There were some 300 boys and girls attending this camp.

A special feature of the camp was a parade to the grandstand by counties, which was judged, and a prize awarded to Renfrew County.

Canadian National Exhibition—Junior Section

In the Live Stock Judging Competition there were 204 competitors taking part, and 82 competitors taking part in the Fruit and Vegetables, Grain and Roots, and Dairy Products Judging Competitions.

Class	*Winners*	*County*
Heavy Horses	Ray Ingleton, Agincourt No. 1	York
Dairy Cattle	David Pelletterio, Milton No. 6	Halton
Beef Cattle	Jack Pearson, Uxbridge No. 2	Ontario
Sheep ... Tie	Glen Dickson, Rothsay Bill Brethett, Tottenham No. 3	Wellington Simcoe S'th
Poultry	Lawrence Copeland, Newton Robinson	Simcoe S'th
Swine	Bruce Boyington, Uxbridge No. 4	Ontario
Fruit & Vegetables	Stewart Carpenter, Vineland	Lincoln
Grain & Roots	Smith Griffin, Acton No. 1	Wellington
Dairy Products	Keith McConachie, Hagersville No. 3	Haldimand

The boys and girls taking part in these competitions were provided with an evening meal, a pass to the grounds, and a ticket to evening grandstand performance.

Royal Winter Fair — Junior Section

Thirty-seven teams of three boys each entered the Inter-County Live Stock Judging Competition at the Royal in competition for the Jeffrey Bull Memorial

Trophy. In addition there were 24 entries in the Robert Graham Memorial Trophy Competition in horse judging.

Winning Team	*Team Members*	*Coach*
Perth County	Wm. Sebben, Stratford No. 4	R. E. White
	Wm. Gibb, Stratford No. 3	W. J. Knapp
	Doug Hammond, Atwood	

Gold Medal Winners—

Heavy Horses	Donald Milburn, Peterborough No. 4	Peterborough
Dairy Cattle	David Pelletterio, Milton No. 6	Halton
Sheep	R. J. Stewart, Bolton No. 4	Peel
Beef Cattle	Frank Stenger, Enniskillen	Durham
Swine	Perry Winch, Keswick	York

Robert Graham Memorial Trophy — H. R. Baker, O.A.C., tied with W. S. Kilmer, O.A.C.

E. H. Stonehouse Memorial Trophy — R. J. Stewart, Bolton No. 4, Peel County.

F. K. Morrow Scholarship Award — R. J. Stewart, Bolton No. 4, Peel County.

All contestants were given a dinner by the Department, passes to the Fair, and tickets to the evening Horse Show by the Royal Winter Fair.

Two days of coaching practice were arranged at the Ontario Agricultural College, Guelph, for all contestants.

The King's Guineas Classes

One hundred and seventeen club members entered baby beef calves in this class at the Royal. There were 52 Shorthorn calves, 35 Hereford and 30 Angus.

The first prize calf in each class was shown by:

Shorthorn—Duncan Campbell, Moffat
Hereford—Vera Jacques, Jarvis No. 3
Angus—Sinclair A. Robertson, Port Perry No. 2

The Shorthorn calf shown by Duncan Campbell, Moffat, was made Grand Champion, and the King's Guineas ($250.00) were presented by His Excellency Viscount Alexander of Tunis, Governor-General of Canada. This 920-pound calf later sold by auction for $2.00 per pound, bringing his owner some $1,840.00, including prize money.

The reserve Champion sold for $1.00 per pound and the remainder from 33c to 42c per pound, averaging approximately 37c per pound.

SHORT COURSES

The Community Programmes Branch of the Ontario Department of Education co-operated in developing Night School Programs in 22 Counties during the year. A selection of Courses attracted more than 3,000 people one night a week for periods varying from ten to twelve weeks. Courses of study offered included: General Agriculture, Farm Business, Motor Mechanics, Farm Engineering and Shop Work, Electricity on the Farm, Woodworking, Home Furnishings, Clothing, Home Management, Public Speaking, Drama, Weaving, Leather Craft, St. John Ambulance and Music. Co-operative Night School classes were held at the following points during 1949-50:

County	*Location*	*Total Enrolment*
Carleton	Normal School Bldg., Ottawa	162
Carleton	Kars	46
Dundas	High School, South Mountain	64
Elgin	East Elgin High School, Aylmer	26

County	*Location*	*Total Enrolment*
Frontenac	Sydenham High School, Sydenham	112
Glengarry	Alexandria	130
Grenville	Kemptville	135
Grey	Owen Sound and Meaford	95
Haldimand	Rural Youth Centre, Kohler	278
Hastings	Belleville School	117
Hastings	Stirling High School	
Huron	Wingham	143
Kent	Ridgetown	300
Leeds	Athens High School	46
Lennox and Addington	Napanee	36
Norfolk	Junior Farmer Bldg., Simcoe High School, Singer Sewing Centre, Simcoe	130
Perth	Listowel High School, Mitchell	189
Prince Edward	Picton	248
Renfrew	Eganville-Cobden	50
Simcoe South	Alliston	207
Stormont	Finch High School	112
Waterloo	Kitchener-Waterloo Collegiate	102
Waterloo	Elmira	184
Wellington	Palmerston	58
Wentworth	Lynden	261

RADIO AND PUBLICITY

The Agricultural Representatives continued to receive excellent co-operation from their local and farm press in respect to publicity for their work, with 4,364 press releases given out.

Six local Radio Broadcasting Stations feature a weekly broadcast on agricultural subjects by Agricultural Representatives. In all, 462 Radio Broadcast talks were given by Agricultural Representatives and Assistants during the year.

JUNIOR FARMERS

Membership and Organization

Many new local and County organizations were formed in the past year. The provincial association now consists of 302 affiliated organizations, an increase of 17 over last year. It is expected that there will be an affiliated membership as of April, 1950, of some 11,000 members.

There has been a gradual numerical increase in clubs and membership since the formation of the Provincial Association in 1944. Already some Counties have expanded to a point where community or township associations now cover the entire County. In these counties and in others, an endeavour should be made to interest a large number of other young farm people who have not joined, as yet, any of the existing clubs. In this way, the organization may eventually reach a membership twice as large as it is today. Local clubs also endeavour to increase the active participation of their present membership by planning a program to suit the needs of all the members.

The new constitution adopted at the annual meeting last year giving each county and district the opportunity to appoint a provincial director, increased the Provincial Association's services to the local clubs. It has also given assured representation of girl directors on both the provincial board and the executive committee.

Two meetings of the directors were held during the year, and three Executive committee meetings. Special committees conducted much of the Association's business.

Finances

During the past year, the Provincial Association has become more financially independent than it had been previously. This has been made possible by a grant to the Association from the Ontario Department of Agriculture, and a larger affiliation fee collected from the Junior Farmer membership. Efforts are being made also to place Field Days and Conferences on a more self-supporting basis. The Association is now able to sponsor projects from its own funds, and to provide remuneration for directors and committees while away from home on association business.

Conferences

Five conferences of varying duration were held during the year. Two were held for Juniors in Northern Ontario, one at Haileybury, and one at Fort William. At the Kemptville Agricultural School and at the Federation of Agriculture Annual Meeting at Toronto, two further conferences were held. The program presented at these was of an educational nature as well as presenting ideas which would stimulate Junior Farmer organization. At the two latter conferences, a short three-act play was presented on the topic of "Farm Family Business Agreements." Since then, this play has been presented in various counties by many local clubs.

The provincial conference held at the time of the Annual Meeting at Guelph is one which gives many delegates an opportunity to learn more about the provincial association as well as gathering ideas which can be used in programs and projects in their home clubs. Altogether, 1,300 young men and women attended these five conferences.

Leadership Training Activities

Five training schools for officers of local clubs were held, all of one day duration. These schools were actually workshops to aid delegates to plan more worthwhile club meetings on program planning, both educationally and socially. Effective leadership was provided by officers of the Association and by members of the Department of Agriculture. A total of 307 officers attended. It was felt that more of these should be held so that a larger number of officers may attend.

Three district camps, each of one week's duration were held in 1949, one at Amesdale for the Districts in north-western Ontario; one each in Brant and York Counties for Juniors from the surrounding counties. District camps are jointly sponsored by the county and district Junior Farmers' Association and the Ontario Department of Agriculture. Capable staff and leaders provide an educational program, and give the campers a confidence and training which is useful in Junior Farmer work.

The provincial camp, held at Geneva Park on Lake Couchiching, was attended by sixty-nine campers from the various counties and districts in Ontario. A program of wide interest was presented. This year, two new instructors were added, one in Nature Study and one in Program Planning. As well, crafts, music, social and physical recreation, and drama were studied. A Chaplain guided the devotional periods.

In all, 194 young people took part in the camping program in 1949. Camping is one of the best training grounds for young people, and anyone afforded the opportunity to attend should try to do so.

Public Speaking and Amateur Entertainment

The fifth annual Public Speaking Competition for young farm people was organized and conducted in 1949. Local county, district and zone contests led up to the final competition in Toronto in January when Mrs. Marion Hough, Stormont County, was judged the provincial winner.

The Amateur Entertainment presentations on a group basis were held in conjunction with the Provincial Public Speaking Competition, but on a non-competitive basis.

Field Days

Four regional Field Days for Junior Farmers were organized at the Western Ontario Experimental Farm, Ridgetown; the Ontario Agricultural College; the Ontario School for the Deaf, Belleville; and the Kemptville Agricultural School, Kemptville. Approximately 2,500 people attended these various Field Days. Competition improved in 1949 with softball teams and track contestants being more representative of the membership of Junior Farmer Clubs.

Junior Farmer Film

In 1949 "Farmers for the Future," a 20-minute film in sound and colour, was completed by Imperial Oil Limited for the Junior Farmers' Association of Ontario. The premiere for this film was held on Monday, November 7th, at Stratford in Perth County where many of the scenes were shot. Since that time there has been a heavy demand for the film to be shown to local Junior Farmer Clubs. Four prints are held at the Film Extension Service, O.A.C., Guelph, for use in Ontario. It has been shown in other provinces in Canada and a French language sound track has been placed on one print. The film is to be shown overseas, and in the U.S.A. as well.

Affiliation

The Executive Committee of the Junior Farmers' Association act as the Junior Directors of the Ontario Federation of Agriculture. Two representatives were appointed to the F.W.I.O. Board — Olive Maltby, Peel County, and Gladys Houghton, South Simcoe County. Two members of our Association acted on the Board of the Royal Winter Fair Association in 1949 — Gordon Orr, Maple, and Marshall Bethune, R.R. No. 4, Hamilton. Mr. Wesley Down of Hilton represented the Association on the Canadian National Exhibition Association Board. Observing membership was also continued with the Co-ordinating Committee of Canadian Youth Groups in Toronto.

Exchange Visits

From the States of North Carolina and Pennsylvania, four delegates attended the 1949 Provincial Camp at Lake Couchiching. Two members of the Rural Youth of New York State attended the Kemptville Conference early in January.

Nine Directors and Executive members of the Junior Farmers' Association attended the Rural Youth of the U.S.A. Conference at Jackson's Mill in West Virginia in October, 1949. Paul Valade from Glengarry County along with the Assistant Agricultural Representative from the county of Prescott and Russell, Mr. Felix Millette, attended the Seventh Provincial Convention of 4-H Clubs of Quebec in Montreal in August. Two carloads of Juniors from Ontario attended two Leadership Training Schools held at Batavia and Watertown in New York State in February, 1950. Mr. Allen Poole, President, attended a National Rural Youth Training Conference in the State of Tennessee the latter part of March.

In December of 1949, a delegation of 18 young men and 12 young women attended the National 4-H Club Congress in Chicago.

Junior Farmer Farm Equipment Project

During 1949 a Farm Equipment project was sponsored by the Junior Farmers' Association of Ontario, and the Ontario Department of Agriculture, with the co-operation of the Ontario Retail Farm Equipment Dealers' Association, the University of Toronto, and Imperial Oil Limited. Local projects were conducted in Ontario by 59 local Junior Farmer clubs in 35 counties and districts. Over 600 contestants took part in an examination based on 30 study questions, and a driving competition. At the Provincial Driving Competition held in Toronto in January, 32 boys competed, in an examination, a tractor equipment defects test, and a driving competition. Donald Steckle of Essex County was declared the winner. Prize money and certificates were donated by Imperial Oil Limited, Goodyear Tire and Rubber Company, and the Ontario Retail Farm Equipment Dealers' Association.

Conservation Brief

The Junior Farmers' Association was given the opportunity of presenting a brief to the Select Committee of the Ontario Legislature on Conservation. Among other things, the brief recommended that conservation education be introduced into primary and secondary schools, colleges and universities. It also recommended that assistance to young farmers with proven experience be made available for the purchase and establishment of their own farms. A survey was conducted in five counties by local Junior Farmer clubs to supply the latter recommendation. Some of the recommendations made were included in the Committee's report which has now been made known.

Farm and Home Safety

During the year, considerably more emphasis has been placed on safety on the farm and in the farm home. It was stressed at the leadership training schools, in the farm equipment project, and an exhibit on the subject was prepared for showing at the Royal Winter Fair.

Appreciation

Junior Farmers appreciate the assistance which they receive through their local, county and provincial associations, from many rural and urban senior organizations, township and county councils, and the generous financial support of the Ontario Department of Agriculture.

However, the Agricultural Representatives, to a large extent, guide the local associations in their activities and programs. The Junior Farmer program in Ontario is now appreciated as one of the major Agricultural Extension Programs of the Ontario Department of Agriculture.

OFFICE STATISTICS

54 Offices

	Total	*Average per office*
No. Letters Received	135,890	2,516
No. Letters Written	120,108	2,224
No. Circular Letters Mailed	667,717	12,550
No. Incoming Telephone Calls	132,761	2,459
No. Visitors in Office	135,897	2,517
No. Meetings held in Office	4,973	92
No. Bulletins and reports distributed through office	131,812	2,441
No. Miles travelled on Government business	1,348,113	24,965
No. Meetings Addressed	4,306	80
No. Meetings Attended	4,093	76
Total Attendance at all Meetings	715,395	13,248

CO-OPERATION AND MARKETS BRANCH

The activities of the Branch are devoted to administering The Farm Products Marketing Act under the jurisdiction of The Farm Products Marketing Board, The Credit Unions Act, under the jurisdiction of the Registrar and Inspector of Credit Unions, The Ontario Food Terminal Act, under the jurisdiction of The Ontario Food Terminal Board, and The Farm Products Containers Act.

THE FARM PRODUCTS MARKETING BOARD

Under the Farm Products Marketing Act, the Farm Products Marketing Board is given authority to recommend the approval of marketing schemes, and, if approved by the Minister of Agriculture, to establish and supervise the operation of local boards to administer the schemes.

Marketing schemes are the legally constituted means for collective bargaining and regulating the sale of designated farm products. Each scheme must provide for a definite program of marketing activities and must be supported by a vote by ballot showing that a fairly representative number of the growers concerned are in favour of the scheme.

Each scheme is administered by a local board of growers, elected by the growers. Subject to the approval of the Farm Products Marketing Board, local boards are empowered to negotiate and fix agreements respecting minimum prices, forms of contract and conditions of sale. Growers now have some direct voice and authority in marketing their own produce.

Presently there are fifteen schemes covering twenty-four crops in force under the Act, viz.,

The Ontario Cheese Producers' Marketing Scheme, 1938
The Ontario Asparagus Growers' Marketing Scheme, 1938
The Ontario Pear, Plum and Cherry Growers' Marketing Scheme, 1938
The Ontario Peach Growers' Marketing Scheme, 1938.
The Ontario Sugar Beet Growers' Marketing Scheme, 1942
The Ontario Seed-Corn Growers' Marketing Scheme, 1942
The Ontario Berry Growers' Marketing Scheme, 1944
The Ontario Bean Growers' Marketing Scheme, 1944
The Ontario Vegetable Growers' Marketing Scheme, 1946
The Ontario Hog Producers' Marketing Scheme, 1946
The Ontario Cream Producers' Marketing Scheme, 1947
The Ontario Grape Growers' Marketing Scheme, 1947
The South-Western Ontario New Potato Growers' Marketing Scheme, 1948
The Ontario Soya-Bean Growers' Marketing Scheme, 1949
The Ontario Winter-Celery Growers' Marketing Scheme, 1949

A brief comment on the working of each scheme will illustrate the scope of the marketing activity involved.

1. *The Cheese Scheme*

Some 26,000 milk producers supply milk for processing into cheese. The cheese scheme was the first marketing scheme approved under the Act. The purpose of the scheme is—

> "to require the primary sale or primary offer for sale of all cheddar cheese produced in Ontario to be made on local cheese boards under uniform rules and regulations."

2. *The Asparagus Scheme*

Some 700 growers sell asparagus annually to the canners in Ontario for processing. Only the processing industry is regulated, i.e. asparagus sold on the fresh vegetable market is exempt from the scheme. One marketing agency appointed by the local board sells all the asparagus purchased for processing, each growing district being allotted its share of the tonnage sold. A unique feature of this scheme is an agreement by the growers to cease cutting when total orders have been filled. In this way production is fitted to demand.

In 1949, 1,170 tons of asparagus were sold for processing at a total value of $424,729.16. This compares with 971 tons valued at $359,844.05 sold for processing in 1948.

In 1949 asparagus minimum prices compared with 1948 were:

	1949		*1948*
Grade No. 1	25c per lb.	Grade No. 1	25c per lb.
Utility Grade A	18½c " "	Utility Grade A	18½c " "
Utility Grade B	14c " "	Utility Grade B	14c " "
Grade No. 2	7c " "	Grade No. 2	7c " "

Producers actually received 20c per pound for utility Grade A in both 1949 and 1948 after the season opened in order to divert a larger tonnage of produce from the wholesale and retail fresh vegetable market.

3. *The Pear, Plum and Cherry Scheme*

Some 2,700 growers sold 4,407 tons of sour cherries valued at $1,061,578.80; 339 tons of sweet cherries valued at $81,967.05; 1,101 tons of plums valued at $64,973.95; 4,911 tons of Bartlett pears valued at $464,485.06 and 6,500 tons of Kieffer pears valued at $293,891.68, or a total of $1,966,895.54 for processing in 1949.

This compares with 4,402 tons of sour cherries valued at $2,191,964.56; 317 tons of sweet cherries valued at $80,595.06; 1,573 tons of plums valued at $92,571.22; 513 tons of Bartlett pears valued at $57,256.63, and 3,786 tons of Kieffer pears valued at $215,160.53, or a total of $2,637,548.00 sold for processing in 1948.

Cherry, plum and pear minimum prices in 1949 compared with 1948 were:

	1949	*1948*
Sour cherries	$240. per ton	$270. per ton
Sweet cherries	240. " "	open market
Plums	57.50 " "	57.50 per ton
Prunes	70. " "	80. " "
Bartlett pears 2" and up	110. " "	117.50 " "
Bartlett pears 1¾" to 2"	65. " "	82.50 " "
Kieffer pears 2" and up	45. " "	60. " "
Kieffer pears 1¾" to 2"	45. " "	40. " "

4. *The Peach Scheme*

Some 900 growers sold 22,468 tons of peaches valued at $1,972,450.42 for processing in 1949. This compares with 15,889 tons of peaches valued at $1,429,949.63 sold for processing in 1948.

Peach minimum prices in 1949 compared with 1948 were:

	1949	*1948*
Jubilee	$97.50 per ton	$100. per ton
Elbertas	87.50 " "	90. " "
"V" type and other varieties	82.50 " "	85. " "

5. *The Sugar Beet Scheme*

Some 3,590 growers sold 335,347 tons of sugar beets from 30,047 acres with an average sugar content of 16.84% for a total value of $4,700,000 for processing in 1949. This compares with 197,152 tons from 18,457 acres with an average sugar content of 17.43% for a total value of $2,800,000 sold for processing in 1948.

The minimum average price (16% beet) in 1949 delivered plant was $13.50 per ton compared with $13.25 per ton in 1948.

6. *The Seed-Corn Scheme*

The membership of this marketing group is comprised of 213 hybrid corn growers and 125 open-pollinated corn growers in south-western Ontario who specialize in the production of corn for seed.

Through negotiation between the grower and the dealer a basic price is established for corn to which a premium is added to arrive at a minimum price to the grower for corn for seed.

In 1948 and 1949 the basic price for corn was established as the Chicago May corn future daily closing price (subject to the current rate of exchange) a bushel average for the three months December, January and February.

In 1949, 247,500 bushels approximately of hybrid corn for seed and 121,440 bushels approximately of open-pollinated corn for seed were produced compared with 275,000 bushels of hybrid corn for seed and 100,000 bushels of open-pollinated corn for seed produced in 1948.

The minimum prices for hybrid corn for seed and for open-pollinated corn for seed in 1949 compared with those in 1948 were:

HYBRID CORN FOR SEED

	1949	*1948*
Schedules A, B, C, D	*The base price and a premium of 30% on on base price also allowance for certain costs when assumed by the grower namely:*	*The base price and a premium of 15c a bu. plus 20% also allowance for certain costs when assumed by the grower namely:*
(a) Dealer supplies the seed and detassels the corn. Grower delivers the corn on the cob to the dealer.	$1.85 a bu.	$1.88 a bu.
(b) Grower supplies the seed, detassels and delivers the corn on the cob to the dealer.	$1.85 a bu. and 58c a bu. = $2.43.	$1.88 a bu. and 65c a bu. = $2.53 a bu.
(c) Grower supplies the seed, detassels, dries, shells and delivers the dried shelled corn to the dealer.	$1.85 a bu. and 93c a bu. = $2.78.	$1.88 a bu. and $1.00 a bu. = $2.88 a bu.
(d) Grower supplies the seed, detassels, dries, shells, processes and delivers the seed-corn to the dealer after final inspection grading and sealing.	$1.85 a bu. and $1.90 a bu. = $3.75.	$1.88 a bu. and $1.97 a bu. = $3.85 a bu.

OPEN-POLLINATED CORN FOR SEED

Schedule E	*1949*	*1948*
The grower supplies the seed and delivers the corn on the cob to the dealer.	*The base price and a premium of 30% on the base price also additional allowance for certain varieties.*	*The base price and a premium of 15c a bu. plus 20% also additional allowance for certain varieties.*
Yellow Dents (other than Early Golden Glow)	$1.85 a bu.	$1.88 a bu.
Other Dents (including Early Golden Glow)	$1.85 a bu. and 10c a bu. = $1.95 a bu.	$1.88 a bu. and 10c a bu. = $1.98 a bu.
Flints	$1.85 a bu. and 50c a bu. = $2.35.	$1.88 a bu. and 50c a bu. = $2.38 a bu.

7. *The Berry Scheme*

Some 400 growers sold 1,263,735 qts. of strawberries valued at $258,659.98; 802,218 qts. of red raspberries valued at $259,863.08, and 372,519 qts. of purple raspberries valued at $146,030.09 sold for processing in 1949. This compares with 5,063,304 qts. of strawberries valued at $934,089.92; 380,618 qts. of red raspberries valued at $71,571.05 sold for processing in 1948.

Strawberry and raspberry minimum prices in 1949 compared with 1948 were:

Strawberries	18c per qt. box	Up to July 1st, 18c per qt. box After July 1st, 16c per qt. box
Raspberries	Open market	Open market

8. *The Bean Scheme*

Some 5,700 growers marketed approximately 1,200,000 bushels of dry beans in 1949 compared with approximately 1,250,000 bushels in 1948. Returns to growers were on a price basis of $3.50 per bu. for No. 1 beans in 1949 compared with a price basis of $4.15 per bu. for No. 1 beans in 1948. The maximum charge by dealers for grading and picking beans was established at 2% of the minimum price set for each pound of culls picked out in excess of 1 lb. per bu. The equalization fee deducted from the growers to support the $3.50 per bu. minimum price was 45c per bu. in 1949. The equalization fee deducted from the growers to support the $4.15 per bu. minimum price was 38c per bu. in 1948.

9. *The Vegetable Scheme*

Minimum prices for 1949 compared with 1948 were as follows:

	1949	*1948*
Tomatoes	$22.60 per ton	$25.10 per ton
Green peas	60.00 " "	65.00 " "
Sweet corn	22.50 " "	22.00 " "
Green or wax beans	82.50 " "	75.00 " "
Beets—		
¾″ to 1¼″ dia.	$60.00 " "	
1¼″ to 1¾″ dia.	40.00 " "	
1¾″ to 2½″ dia.	30.00 " "	
1¾″ dia. and up	20.00 " "	
2½″ to 4½″ dia.	15.00 " "	
Carrots—		
Min. dia. 1¼″, ungraded, June 25th to Aug. 15th	45.00 " "	
Min. dia. 1½″, ungraded, Aug. 16th to Mar. 31st	20.00 " "	
Cabbage	10.00 " "	

Some 13,500 growers sold 164,061 tons of tomatoes valued at $3,876,531.40; 10,718 tons of green peas valued at $655,610.50; 76,903 tons of sweet corn valued

at $1,745,274.56, and 1,563 tons of green and wax beans valued at $130,506.58 sold for processing in 1949, or a total value of $6,407,923.04. This compares with 329,371 tons of tomatoes valued at $8,539,788.64; 24,425 tons of green peas valued at $1,628,853.06; 45,169 tons of sweet corn valued at $1,012,324,83, and 1,652 tons of green and wax beans valued at $134,400.30 sold for processing in 1948, or a total value of $11,317,366.83.

10. *The Hog Scheme*

The hog industry is the most important branch of Ontario agriculture, both in volume and value of production and in number of producers affected, to come under the provisions of the Farm Products Marketing Act.

Despite the complicated problems involved, particularly as a substantial volume of live hogs shipped inter-provincially is outside the jurisdiction of the scheme, progress has already been made, especially in connection with "conditions of sale" for hogs. Certain agreements covering "Rules for the sale of hogs" have been negotiated and approved. These provide for the purchase of hogs on a basis of rail grade with payment to the producers on that basis; supplying the producers with an adequate form of settlement statement; adequate identification of each producer's hogs in all shipments and other related matters.

To the above end, the various types of drovers, shippers and handlers of hogs have now been grouped into two classes and licensed as such:

(1) "shippers" operating as agents on behalf of named processing plants; and

(2) "shippers" operating as agents on behalf of a producer or group of producers.

During the year under review, there were issued: 112 processor's agents' licences; 457 producer's agents' licences, and 160 processors' licences.

The Negotiating Committee of producers and packers appointed under the Regulations of the scheme met monthly throughout the year and gave considerable study to losses due to bruising, feed supplies, quality programs and methods of distribution.

11. *The Cream Scheme*

Rating equally with the hog scheme in the number of producers affected but somewhat less than half its value of production at $35 million, the cream scheme covers the second industry in importance in Ontario agriculture to come under the provisions of the Farm Products Marketing Act. Despite the difficulties involved in the marketing of a product in which the Province is not self-sufficient and which necessitates the shipping in of substantial quantities of butter, particularly from Western Canada, the cream producers of the Province propose to negotiate and determine minimum prices for cream for butter manufacture, premiums and discounts for the various grades of cream, conditions of sale, transportation and other matters related to the marketing of sweet cream for butter purposes.

12. *The Grape Scheme*

Some 1,300 growers marketed 14,524 tons of grapes valued at $1,089,364.96 for processing in 1949. This compares with 18,926 tons of grapes valued at $1,470,185.35 sold for processing in 1948.

Reflecting continued curtailed winery demand, grape minimum prices in 1949 compared with 1948 were:

	1949	*1948*
Grapes	$75.00 per ton	$77.50 per ton

13. *The South-Western Ontario New Potato Scheme*

As noted in its 1948 annual report, this scheme is the Board's first experiment in what is called an open market scheme. By that is meant a commodity sold in its natural state to the wholesale and retail trade, rather than just that portion of the crop sold to the processors as with most of the other cash crop schemes presently in operation. Naturally, a scheme of this character required a different approach altogether from the other plans. The product concerned in this case is produced in the counties of Essex and Kent. The marketing season is short, beginning the last week in June and ending on September 1st. The volume involved in 1949 was just under 800,000 75-lb. bags produced by some 700 growers harvesting approximately 7,000 acres. To make a long story short, the primary shippers of new potatoes in the area were licensed. A committee of three of these licensed shippers, together with three growers named by the local board, was appointed a negotiating committee to set minimum prices and terms of contract. In the fast moving market where produce of this type is distributed the minimum prices set can hold only until further notice. Meetings were frequent as conditions changed, the discussion seemingly endless, but when the season was finished, only four downward price changes were made as volume increased for the whole crop; from the opening quotation of \$2.50 per bag on June 15th to the closing price of \$1.50 per bag on or about August 15th f.o.b. Leamington. The scheme is not a 100% success, but much has been learned from the first two years' experience. It does appear, however, that with certain crops produced in volume in specialized areas, some measure of open market price stabilization is possible. Dealers' maximum charges to the grower for handling potatoes, cash paid by the dealer to the grower for all potatoes on delivery and brokerage payable by the dealer to all licensed brokers in Canada, were some of the terms of contract negotiated and established under the scheme. Regulations were also approved providing for the compulsory grading and inspection of all new potatoes shipped out of the area.

14. *The Ontario Soya-Bean Growers' Marketing Scheme*

As noted in its annual report for 1948, the Board recommended this scheme come into operation with the marketing of the 1949 soya-bean crop. The scheme is similar in principle to the other cash crop schemes in effect, as the market for soya-beans is limited entirely to a few processors for manufacture into various soya oil and meal products. One major difference in the market situation between soya-beans and other processing crops under schemes, however, is that Canada is not more than 40% self-sufficient at the present time in her production of soya-beans for her overall edible oil and meal requirements. Soya-beans may be imported free of duty and oil and meal may be imported at moderate tariff rates. Hence the cost of soya-beans to Ontario processors must at all times be competitive with the delivered cost of foreign soya-beans, soya-bean oil and a host of other competing edible oils. Faced with this situation, a Board of Arbitration decision recommended that a fixed minimum price for soya-beans to the 3,000 interested Ontario growers was not practical, and that the price paid should be the trading price from day to day on an open market basis. The record for the first season's operations of the scheme showed a price range of \$2.19 per bu. to \$2.35 per bu. paid the farmer f.o.b. country shipping point by the processors with an average price of \$2.26 per bu. f.o.b. shipping point paid for the 2,600,000 bu. in the 1949 crop. A dealer's maximum charge of 10¢ per bu. to the grower for cleaning, handling and selling soya-beans, a fixed 1½¢ per bu. discount for each ½% moisture content in soya-beans from 14% to 18% and a fixed 2¢ per bu. discount for each ½% moisture content above 18% with cash to be paid by the dealer to the grower for all soya-beans on delivery were the main terms of contract negotiated and established under the scheme. Due largely to

the development of early maturing varieties and to the elimination of imported soya-beans from China, the production of this crop is reaching commercial proportions never before contemplated in Ontario. Yield has increased from 850,000 bu. in 1946 to 2,600,000 bu. in 1949 and acreage planted to soya-beans in 1950 is expected to exceed considerably that of 1949.

15. *The Ontario Winter-Celery Growers' Marketing Scheme*

As noted in its annual report for 1948, the Board recommended this scheme for approval to come into operation with the marketing of the 1949 crop. The scheme covers only the marketing of late or winter celery in storage or celery offered for sale by the grower after October 15th annually. In many respects the scheme is similar to the South-Western Ontario New Potato Scheme in that the sale of all the crop in its natural state to the wholesale and retail produce trade throughout the Province is covered. The scheme also presents the same pricing problems in its marketing and for the same reasons as does the early potato scheme. Despite the fact the 1949 crop was at a record of over 400,000 crates—an increase of 140,000 crates over 1948—and that marketing was handicapped by a long open fall with a record yield per acre, a minimum price of $1.50 per crate f.o.b. storage plus storage charges to the grower was established and maintained for all No. 1 grade celery through the 1949-50 marketing season. A considerable volume of celery was sold, however, on the authority of the local board at below the minimum price which did not, upon inspection, grade No. 1. The chief difficulty encountered in the scheme's first year of operation, apart from the volume of the crop, was the tremendous extent of celery breakdown in storage due to the rapid growth in the final two weeks before harvest, the amount and manner of storing in September and the inability of the market to take all of the celery in a given period. The chaotic condition of the Montreal wholesale market, a major outlet for Ontario celery, was also a very real contributing factor where celery shipped by growers or their agents on commission from Ontario, and thus outside the regulation of the scheme, undermined all efforts to have Ontario celery purchased f.o.b. Ontario storages by the regular Montreal trade. Correction of this problem lies in extending the authority of the Ontario scheme into inter-provincial and export trade under the Agricultural Products Marketing Act (Dominion), and the Board is advised an application is being made to this end by the celery growers prior to the opening of the 1950 winter celery marketing season.

ONTARIO FOOD TERMINAL BOARD

In view of the continued shortage of labour and materials no construction of any of the facilities to comprise the Ontario Food Terminal Market, other than the further preparation of the site, was undertaken during 1949. Actual developments during the past year were as follows:

(a) installation of the underground electrical ducts and manholes on the western section of the site where the Farmers' Market will be located.

(b) installation of the cement piers for the steel canopy over the sheltered portion of the Farmers' Market and for the light standards in the open section of the Farmers' Market.

(c) paving the 32,000 sq. yd. area which comprises the Farmers' Market.

(d) installation of 500 feet of railway siding on the market site so that certain economies may be made in delivering building supplies direct to the job.

The overall design and plan of the entire project had been completed in 1947 but deferred because of conditions in the construction industry. During 1949, however, the Board reached the decision that the time had arrived when,

subject to assured rentals, construction of the main units to comprise the market should be undertaken. The Board's concern in this connection is that certain large wholesale fruit and produce distributors in need for much larger premises for their own operations, have been debating whether to build privately or to rent space in the proposed Ontario Food Terminal. Further delay at this time, in the Board's opinion, would result in these firms going ahead with their own plans in which case they would be lost as tenants at the Ontario Food Terminal. Thus one of the main objects of the proposed Terminal Market in having the entire wholesale fruit and produce industry in the Toronto area operating at one point and make unnecessary city retailers and country jobbers having to visit several places to secure a complete line or variety of the goods they required would be gone for another generation.

With this situation in mind and having again carefully considered the ability of the project to be financially self-sustaining the Board during September of the year under review instructed its architects to complete as soon as possible detailed plans and specifications so as to advertise for tenders. After consultation with the various Government agencies concerned, it was decided that the tenders would be called by the Ontario Department of Public Works on a stipulated sum basis so a definite idea of cost would be known for the construction of the main group of buildings to comprise the Food Terminal as follows:

(a) two main produce buildings including a cold storage plant.

(b) heating plant, garage and maintenance shop.

(c) small electrical sub-station.

(d) outdoor lighting standards, steel canopy over one selling-aisle and a small office building to complete the Farmers' Market section of the Food Terminal.

During October of the year under review, the Board and its architects delivered to the Department of Public Works complete sets of plans and specifications for the information of bidders tendering on the job and in addition prepared the tender call. At the year end the Board was advised details had been completed by the Department of Public Works whereby tenders would be announced at an early date.

In conclusion, the Board reports that an audit of all receipts and disbursements by the Board for the period from October 1st, 1948, to October 31st, 1949, had been made by the Provincial Auditor and certified copies filed with all concerned.

THE FARM PRODUCTS CONTAINERS ACT

The purpose of the Act is to provide a means of levying a licence fee on containers which include any bag, basket, box, can, crate or other receptacle used or suitable for use in the marketing of fruit, honey or vegetables.

The Act was passed at the request of the Ontario Fruit and Vegetable Growers' Association and the Ontario Beekeepers' Association, and the authority to collect licence fees is presently limited to the members of these Associations within the meaning of the Agricultural Associations Act. The licence fee is payable by the grower or user of the containers purchased but is collected by each manufacturer of the containers in question and is forwarded by him monthly to the appropriate Association. The amount of the fee is added to the invoice of each grower or purchaser on the manufacturer's selling price.

Licence fees in the amount of 1% added to the manufacturer's selling price of all wooden and paper containers manufactured and sold for use in the mar-

keting of fresh fruits and vegetables produced in Ontario have been levied and paid to the Ontario Fruit and Vegetable Growers' Association since November 1st, 1947. The fees received during the fiscal year ended March 31st, 1950, amounted to $29,588.98, and the total fees received to-date by the Association since the levy was imposed amount to $61,761.56.

Licence fees in the amount of 5% added to the manufacturer's selling price of all cans and paper containers manufactured and sold for use in the marketing of honey produced in Ontario have been levied and paid to the Ontario Beekeepers' Association since April 1st, 1948. The fees received during the fiscal year ended March 31st, 1950, amounted to $7,976.68, and the total fees received to date by the Association since the levy was imposed amount to $15,722.30.

ONTARIO CREDIT UNIONS

Every year since 1940 has been one of progress for Ontario credit unions. They have made continuous advances in number of members, value of shares, amounts loaned and in net earnings. Parallel to this growth has been the yearly net gains in the number of credit unions operating. The year 1949 was outstanding in this latter respect in that 75 new credit unions were chartered, with 10 being dissolved, to give a yearly net gain of 65; the highest on record.

It should be pointed out that 10 is also a record number of dissolutions for one year. This is exactly equal to the number of dissolutions for all previous years combined. It is also interesting to note that with over 21 million dollars in asests and over 500.000 dollars in yearly net earnings, Ontario credit unions earmark only 7,800 dollars for educational purposes.

Figures showing the growth of Ontario credit unions are in Table 1.

Table 1.

Number of Members, Amount of Shares and Amount of Loans Outstanding December 31 For Active Ontario Credit Unions, 1940-1949.

Year	*Number of Reporting Credit Unions**	*No. of Members*	*Amount of Shares*	*Amount of Loans*
1940	57	14,461	$ 600,746.01	$ 1,424,603.64
1941	83	18,670	801,943.75	1,710,696.66
1942	120	23,699	987,343.78	1,869,602.53
1943	162	32,290	1,354,713.56	1,858,232.69
1944	219	44,480	2,042,471.30	2,609,161.75
1945	248	53,728	2,894,638.01	3,715,780.30
1946	281	63,817	4,010,193.79	5,559,362.04
1947	302	76,081	5,742,629.78	8,343,149.90
1948	356	95,751	8,484,641.60	11,685,703.69
1949	422	118,660	12,495,210.57	16,197,503.39

* From 1940-46 inclusive the number of credit unions reporting equalled the number of charters outstanding. For the remaining years the number of chartered credit unions not reporting was: Nine in 1947; nine in 1948; and 14 not reporting in 1949.

The increases in the number of members and in the amount of money put into shares and in the volume of loans made to members give evidence of a promotion of thrift and of supplying a source of credit to members. Thus two of the three aims of credit unions mentioned in the section following are being being fulfilled.

General

Credit Unions are co-operative savings and loan societies organized on a local basis among groups of people who have a close common bond of occupation or association or are the residents of some well-defined community.

The main objectives of these groups are:

1. To develop the habit of regular saving and to encourage a programme of personal thrift among the members.
2. By the consolidation of the small savings of many members to create a source of credit at reasonable rates of interest for the provident and productive needs of the members, and
3. To develop a programme of education in co-operation and personal finance.

The Credit Union is operated by a Board of Directors with a bonded Manager appointed to handle the funds. Loans are made only after a Credit Committee has approved the same and has defined the necessary security and terms of repayment. The interests of the members are protected by a Supervisory Committee which is responsible directly to the members and which not only audits the books but sees that the provisions of the Act, and of the Certificate of Incorporation are complied with. The Manager, usually a part-time official, is available at regular times to accept deposits and loan repayments and to pay out withdrawals and loans.

Many Credit Unions also provide secondary services such as co-operative hospitalization, loan insurance, savings insurance, etc.

The Credit Union is of European origin, but has attained its greatest development on this continent. The first American group was organized by Alphonse Desjardins in Levis, Quebec, in 1900, and from there the movement has spread until today there are thousands of credit unions throughout the United States and Canada. Even though a few Ontario Credit Unions have been operating for over thirty years, the main development in this Province has occurred since 1940. Only 14 of the existing groups were chartered previous to that year.

Ontario Credit Unions are authorized by The Credit Unions Act, 1940, and amendments thereto, which Act replaced The Co-operative Credit Societies Act, 1922, and The Credit Unions Amendment Act, 1939.

INCORPORATIONS

Application for the incorporation of a credit union is by Memorandum of Association signed by at least twenty persons capable of contracting. Certificates of Incorporation are issued by the Minister of Agriculture.

During the year 1949, 75 certificates were issued and 10 charters were withdrawn.

Table No. 2 gives the incorporations and dissolutions of Credit Unions in Ontario by years since 1928.

FINANCIAL STATEMENT

The financial statements of 422 of the 436 Credit Unions that were carrying on active business at the end of 1949 have been consolidated and the combined statement given below. At the time the report was prepared, 14 active credit unions had not filed returns. Owing to the inadequacy of information in a few of the returns and minor inaccuracies in others, it has been necessary to act upon arbitrary assumption in some cases, which may have led to error. Such errors, however, will be minor.

COMBINED BALANCE SHEET, 1949

ASSETS		LIABILITIES	
Cash	$ 1,722,864.47	Accounts and Loans Payable	$ 744,303.93
Accounts Receivable *	30,161.70	Members Deposits	6,887,054.16
Loans to Members:		Education Fund	7,846.18
Personal	10,562,185.24		
Mortgage	5,635,318.15	Reserves:	
Furniture and Fixtures	43,317.69	Guarantee Fund (Statutory)	474,371.35
Real Estate	16,899.16	Sundry	79,090.43
Investments:		Members Equity:	
of Surplus Funds	2,972,573.86	Share Savings	12,495,210.57
of Guarantee Funds	378,588.29	Undivided Earnings	689,493.41
Prepaid Accounts	15,461.47		
	$21,377,370.03		$21,377,370.03

COMBINED PROFIT AND LOSS ACCOUNT, 1949

EXPENDITURE		REVENUE	
Interest on Deposits	$ 144,281.78	Interest Earned on Loans	$ 1,047,841.78
Interest on Loans	28,189.02	Interest Earned on Investments	125,927.56
Insurance and Bonding	123,513.44	Other Interest Earned	18,411.70
Salaries, Allowances, etc.	196,806.42	Profit on Sale of Securities	4,571.94
Office Supplies and Expenses	71,998.65	Other Income	22,862.85
Rent, Light and Heat	15,111.09		
Other Expenses	59,922.03		
Combined Profit	579,793.50		
	$ 1,219,615.83		$ 1,219,615.83

COMBINED DISPOSITION OF SURPLUS, 1949

TO		FROM	
Guarantee Fund Appropriation (Statutory)	$ 116,252.93	Undivided Earnings: Balance Brought Forward	$ 109,699.91
Rebate on Loan Interest	84,818.37	Profit and Loss, 1949	579,793.50
Education Fund	10,234.35		
Dividends on Shares	286,523.87		
Other Disposition	70,528.65		
Undivided Earnings Forward	121,135.24		
	$ 689,493.41		$ 689,493.41

* This amount is composed chiefly of accrued interest but includes money owing on sale of Cuna calenders and banks, and accounts which were settled by cheques which proved to be N.S.F.

General Purpose

Every Credit Union in Ontario is required to file an "Annual Return and Audited Statement" which return contains not only copies of the financial statements for the past year but also certain statistical information. The following comments on Credit Union progress during the year are based on this information.

(a) In the Province as a Whole

Table No. 2 of the Appendix gives the comparative figures for several years in connection with several important items.

MEMBERSHIP

Total membership in Ontario Credit Unions increased from 95,751 to 118,660 in 1948, an increase of 22,909.

The following table shows the increase in membership by years since 1940.

MEMBERSHIP GROWTH

YEAR	TOTAL MEMBERSHIP	INCREASE
1940	14,461	5,652
1941	18,670	4,209
1942	23,699	5.029
1943	32,290	8,591
1944	44,480	12,550
1945	53,728	8,888
1946	63,817	10,089
1947	76,081	12,264
1948	95,751	19,670
1949	118,660	22,909

Total Assets

Accumulation of assets is not the sole criterion of credit union success and many relatively small groups are rendering a very worth-while service to their members. However, the growth of credit unions is clearly indicated in the increase in the amount of total assets. The average yearly increase in total assets since 1939 has been 29 per cent. The increase of total assets by \$4,890,056.24 in 1949 was a gain of 29.6% over 1948 or about the same as the 11 year average.

Loans to Members

Loans to members taken as a percentage of total assets continued to climb. This is to be expected since over half of the 423 active credit unions in Ontario have been incorporated in or since 1944.

In any sizeable group of people there is always a need for a large number of loans usually of an emergency nature. New credit unions usually start with a small amount of share capital and are almost immediately pressed for funds to meet these loan demands. If the pattern of older groups is followed then, as the movement becomes older and the members accumulate savings, these emergency loans are augmented by an increasing number of productive loans and the increase in amount of loans becomes slower than the increase in shares.

The total loans made increased from \$12,888,350.74 to \$17,474,149.92 in 1949 or 35.6%.

During the year \$21,695.93 of loans were written off. This is .124% of the loans made in 1949.

(b) Geographic Progress

The spread of credit union activity throughout Ontario has come about largely through voluntary organizational work and other personal contact. This has resulted in a tendency for development to be geographically concentrated — there are 104 groups in Toronto; 44 in Hamilton; 35 in Windsor; 26 in Cochrane District; 19 in Thunder Bay District; 19 in Ottawa, and 15 in Simcoe County. At the present time, there are chartered groups in all districts except Patricia, Manitoulin and Parry Sound and in all but 15 counties.

The following table shows that the geographic distribution of new groups continues to favour the counties of Carleton, Essex, Middlesex, Wentworth and York which contain such urban centres as Ottawa, Windsor, London, Hamilton and Toronto.

Geographic Distribution of New Credit Unions by Counties

Eastern	Carleton	2	
	Leeds	1	
	Stormont	1	
	Peterboro	2	
	Ontario	2	8
Western	Essex	6	
	Lincoln	4	
	Brant	1	
	Wellington	3	
	Middlesex	5	
	Oxford	2	
	Waterloo	2	
	Welland	1	

	Lambton	1	
	Simco	1	
	Wentworth	7	
	York	21	54
Northern	Algoma	3	
	Cochrane	1	
	Thunder Bay	3	
	Sudbury	4	
	Nipissing	2	13
			75

The greatest numerical development has occurred in the cities of Central and Western Ontario. The greatest accumulation of assets has taken place among the Parish and Civil Service groups in Ottawa, some of which have been operating for more than a quarter of a century. The greatest rural development has been in Eastern and Northern Ontario, particularly among the French speaking groups.

(c) Progress among the Various "Bond of Association" Groups

Even though Credit Union charters may be issued to all groups having the necessary "common bond" there has been a tendency in Ontario for certain types of groups to organize many credit unions and for others to ignore the movement. Again, when organized, some types have developed much more satisfactorily than others.

The predominance of parish groups, urban and rural, and of industrial groups is very evident. Community groups, which have been very successful in some provinces, are not so prominent in Ontario.

A summary of the situation at the end of 1949 was:

	New	Established	
Associational			
Parish Groups—Urban	12	65	
Rural	2	40	119
Co-operatives —Urban	3	13	
Rural	—	15	31
Racial	2	26	28
Community—Urban	3	23	
Rural	—	26	52
Occupational			
Industrial	20	72	
Public Service	11	29	
Utility Employees	11	26	169
Miscellaneous	11	29	40
	75	364	439

(d) Progress According to Age Group

The development of a successful Credit Union usually follows a standard pattern. For the first year or two there is a regular but often slow progress. Then, as the members become familiar with the services rendered and as the

management becomes matured, there is a consistent increase in membership and a gradual increase in total assets, which increase continues indefinitely.

League Activity

Organizations have been formed in the Province under Section 48 of The Credit Unions Act to provide league facilities on both a provincial and a regional basis.

The Ontario Credit Union League Limited was incorporated in 1942 and now has 342 member credit unions. The League holds a two-day convention in connection with its annual meeting; this year at London, where Credit Union matters of province-wide interest were discussed.

La Federation des Caisses Populaires d'Ottawa et Districts Ltee was organized in 1946 and now has 29 member caisses populaires. The Federation was organized to provide service to French-speaking groups in the Ottawa Valley.

La Caisse Regionale de Cochrane et Temiskaming Ltee was organized and incorporated in 1947 among the caisses populaires in these Districts and now numbers 23 groups as its members.

These organizations are incorporated to further educational programmes in their areas and to provide member groups with such services as a supply department, central credit facilities and bookkeeping and auditing assistance.

Rural Credit Unions

Of the 75 new credit unions formed in 1949 only two (2) were rural groups. Of the 10 credit unions dissolved, in 1949, three were rural. This is the first year that there has been a net decrease in the total number of rural credit unions.

Since 1947, when they comprised 24.3% of all credit unions the rural movement has slipped until now it is only 19% of the total. Of the 84 rural groups at present chartered, 14 are considered to be inactive. Despite this development their total membership increased from 9,343 to 9,753 while their assets increased over $170,000.00 to reach a new peak of $1,683,606.44 They also loaned $1,217,157.04 to their members — an increase over 1948 of $263,210.54.

Conclusion

From 1945 to 1948 inclusive the formation of new groups was considerably lower than the previous peak of 58 incorporated in 1944. The rate of growth as measured by the number of new credit unions for these years appeared to have arrived at an average 40. However, in 1949, growth of this nature surged upward and 75 new groups were formed. In view of this it would be difficult to predict the possible limits of expansion in either existing groups or in the incorporation of new credit unions.

The credit in large part for this year's organizational drive is due to officials of the three leagues and the Credit Union National Association and to leaders in the local credit union chapters. Volunteer workers also played a considerable part in the formation of new groups.

The success and efficiency of operation of these new groups as well as of the established credit unions will depend on the faithful performance of duties by elected officers and in the enterprise shown in their educational programmes.

Competent officials alone cannot insure a strong and vigorous movement. The strength of all credit unions ultimately rests on an informed and active membership. For this reason, educational work is equally — if not more — important after as well as before organization. Credit unions in order to flourish and maintain growth must have the continuous interest of their members. This is best achieved by general adoption among the members of a systematic method of saving. Active educational committees are necessary to instill such ideas; to train and develop capable leaders and to induce and sustain membership participation so that there will be an awareness of the need for sharing responsibilities, of providing a democratic control of the finances and, above all, to keep available and even enhance the benefits and services which a credit union provides.

More than 118,000 people in the Province are now using the medium of credit unions to accumulate savings and to satisfy most of their credit needs. During the past year more than $17,700,000.00 was advanced to members in the form of loans for provident and productive purposes and during the life of existing credit unions this figure approximates seventy million dollars.

TABLE No. 2—CREDIT UNION INCORPORATIONS AND DISSOLUTIONS

Year	*Charters Issued*	*Charters Cancelled*	*Dissolutions*	*Amalgamations*	*Charters Outstanding as of Dec. 31*
1928	1	----	----	----	1
1929	6	----	----	----	7
1930	8	----	----	----	15
1931	8	----	----	----	23
1935	2	----	----	----	25
1936	1	----	----	----	26
1937	----	----	1	----	25
1940	41	9	----	----	57
1941	26	----	----	----	83
1942	38 (a)	----	----	----	121 (a)
1943	43	1	----	----	163 (a)
1944	58	----	----	1	220 (a)
1945	47	----	----	----	267 (a)
1946	40 (b)	----	1	----	306 (d)
1947	36 (c)	5	1	----	336 (e)
1948	39	----	1	----	374 (e)
1949	75	----	10	----	439 (e)

(a) League Charter included.

(b) Federation Charter included.

(c) Regionale Charter included.

(d) League and Federation Charters included.

(e) League, Federation and Regionale Charters included.

TABLE NO. 3 — PRINCIPAL PROVINCIAL STATISTICS
As of December 31

SECTION 1 — (See Sections 2 and 3 Below)

ITEM	1940	1941
Number Charters Outstanding	57	83
League Charters	....	....
Incorporations During Year	41	26
Charters Cancelled or Surrendered	9	....
Number Active Credit Unions	....	....
Total Assets	$1,936,932.23	$2,193,355.25
Total Guarantee Funds	$178,346.58	$197,832.50
SAVINGS OF MEMBERS		
Total Membership	14,461	18,670
Total Share Savings	$600,746.01	$801,943.75
Total Deposit Savings	$1,057,695.53	$1,130,373.49
Total Savings	$1,658,441.54	$1,932,317.24
Total Savings per Member	$114.68	$103.50
LOANS		
Number of Members Borrowing	6,296	7,994
Number of Loans Made	....	....
Total Amount of Loans Made	$1,424,603.64	$1,710,696.66
Average Size of Loan	....	....
Average Yearly Loans per Borrower	$226.27	$214.00
Loans Outstanding December 31st:		
Personal	....	....
Mortgage	....	....
Bad Loans Written Off	$355.50	$770.76

SECTION 2

ITEM	1942	1943	1944	1945
Number Charters Outstanding	120	162	219	266
League Charters	1	1	1	1
Incorporations During Year	37	43	58	47
Charters Cancelled or Surrendered	....	1	1	....
Number Active Credit Unions	....	....	....	248
Total Assets	$2,645,460.51	$3,483,789.50	$4,998,582.56	$6,893,682.96
Total Guarantee Funds	$212,163.01	$216,760.63	$240,580.07	$276,895.65
SAVINGS OF MEMBERS				
Total Membership	23,699	32,290	44,840	53,728
Total Share Savings	$987,343.78	$1,354,713.56	$2,042,471.30	$2,894,638.01
Total Deposit Savings	$1,315,514.98	$1,722,510.73	$2,445,574.96	$3,324,557.72
Total Savings	$2,302,858.76	$3,077,224.29	$4,488,046.26	$6,219,195.73
Total Savings per Member	$97.18	$95.30	$100.09	$115.75
LOANS				
Number of Members Borrowing	9,046	12,266	16,495	19,726
Number of Loans Made	....	23,079	29,336	34,699
Total Amount of Loans Made	$1,869,602.53	$2,398,674.39	$3,466,480.76	$4,658,070.92
Average Size of Loan	....	$103.93	$118.13	$134.24
Average Yearly Loans per Borrower	$206.68	$195.56	$210.15	$236.14
Loans Outstanding December 31st:				
Personal	....	$1,173,941.05	$1,649,357.19	$2,208,461.51
Mortgage	....	$684,291.64	$959,804.56	$1,507,318.79
Bad Loans Written Off	$92.42	$92.67	$708.52	$1,871.05

SECTION 3

ITEM	1946	1947	1948	1949
Number Charters Outstanding	304	333	371	436
League Charters	2	3	3	3
Incorporations During Year	39	35	39	75
Charters Cancelled or Surrendered	1	6	1	10
Number Active Credit Unions	281	302	356	423
Total Assets	$9,305,880.51	$12,253,284.54	$16,487,313.79	$21,377,370.03
Total Guarantee Funds	$320,855.54	$384,035.36	$482,309.09	$590,624.28
SAVINGS OF MEMBERS				
Total Membership	63,817	76,081	95,751	118,660
Total Share Savings	$4,010,193.79	$5,742,629.78	$8,484,641.60	$12,498,210.57
Total Deposit Savings	$4,472,474.62	$5,301,223.49	$6,484,161.53	$6,887,054.16
Total Savings	$8,482,668.41	$11,043,853.27	$14,968,803.13	$19,382,264.73
Total Savings per Member	$132.92	$145.15	$156.33	$163.34
LOANS				
Number of Members Borrowing	24,634	30,501	44,846	55,197
Number of Loans Made	39,631	51,162	64,739	83,396
Total Amount of Loans Made	$6,431,716.09	$9,372,634.89	$12,888,350.74	$17,474,149.92
Average Size of Loan	$162.29	$183.19	$199.08	$209.53
Average Yearly Loans per Borrower	$261.09	$307.28	$287.39	$316.57
Loans Outstanding December 31st:				
Personal	$3,157,264.35	$5,057,053.11	$7,873,931.97	$10,562,185.24
Mortgage	$2,402,097.69	$3,285,096.87	$4,090,658.05	$5,635,318.15
Bad Loans Written Off	$9,657.38	$3,344.59	$18,453.00	$21,695.93

TABLE NO. 4

STATISTICAL SUMMARY OF ONTARIO CREDIT UNIONS

Grouped By Common Bond

(Table No. 4 Continued on Page 85)

(a) Urban Groups (Membership Composed of Non-Farm Residents or Mostly So):

COMMON BOND	No. C.U.'s in Group	Up to end of 1940	Year of Incorporation 1941	1942	1943	1944	1945	1946	1947	1948	1949
OCCUPATIONAL											
Industrial:											
Iron, Steel and Metal	33	1	....	4	3	3	1	2	2	9	8
Motor Vehicles	16	....	....	....	4	7	....	....	2	....	3
Printing	8	2	1	....	1	....	1	....	....	1	2
Foods	5	....	....	....	....	1	3	....	....	1	....
Paper Products	5	....	1	....	....	....	2	....	1	....	1
Pulp and Paper	4	1	1	....	....	....	1	....	1	....	....
Shipbuilding	2	....	....	....	1	1	....	....	....	....	....
Textiles	4	....	....	....	1	....	....	1	....	2	....
Chemicals	5	....	....	....	....	....	1	1	....	1	2
Electrical Equipment	6	....	....	....	1	1	....	....	1	....	3
Rubber	5	1	....	....	1	....	....	....	1	1	1
Soaps	2	....	....	....	1	....	....	1	....	....	....
Miscellaneous:											
Brewing	2	....	....	....	....	1	....	....	....	....	1
Business Machines	4	....	1	....	....	....	....	....	....	....	3
Cleaners	3	....	....	1	....	....	....	....	....	....	2
Farm Machinery	2	1	....	....	....	....	....	....	....	....	1
Glass	1	....	....	....	1	....	....	....	....	....	....
Grain Elevators	2	....	....	....	....	....	....	1	....	....	1
Leather	1	....	....	1	....	....	....	....	....	....	....
Machinery	2	....	....	....	....	....	....	1	....	1	....
Oil	1	....	....	....	1	....	....	....	....	....	....
Photo	1	....	....	....	....	....	....	1	....	....	....
Twine	1	1	....	....	....	....	....	....	....	....	....
Container	1	....	....	....	....	....	....	....	....	1	....
Carpenters	1	....	....	....	....	....	....	....	....	1	....
Lumber	1	....	....	....	....	....	....	1	....	....	....
Inks	1	....	....	....	....	....	....	1	....	....	....
Pottery	1	....	....	....	....	....	....	....	....	....	1
Other	3	....	....	....	....	....	....	....	....	2	1
Public Service:											
Federal	20	2	1	....	3	1	....	1	1	2	9
Provincial	3	....	....	....	....	....	1	1	....	....	1
Municipal	10	2	1	....	....	....	....	1	3	2	1
Teachers	7	2	....	....	1	....	3	1	....	1	....
Utilities:											
Power and Light	3	....	1	1	....	1	....	....	....	....	....
Phone and Telegraph	9	3	....	1	....	....	....	....	....	1	4
Transportation	25	3	3	2	3	1	1	1	3	1	7
ASSOCIATIONAL											
Co-operatives	16	3	1	2	1	1	1	1	3	....	3
Racial	28	10	2	3	1	3	1	4	....	2	2
Religious	76	11	4	6	9	12	8	6	3	5	12
Others	7	....	1	1	1	1	1	1	....	....	1
COMMUNITY											
Towns	8	1	....	3	1	....	1	1	....	1	....
Villages	6	....	....	....	....	1	1	....	....	1	3
Townships	1	1	....	....	....	....	....	....	....	....	....
Neighborhood	8	3	1	....	1	....	3	....	....	....	....
Parish Areas	2	....	1	....	....	....	....	....	1	....	....
All Urban Groups	352	48	20	25	36	35	30	27	21	35	75
(b) Rural Groups (Membership Mostly Farm Resident):											
ASSOCIATIONAL											
Co-operatives	15	....	1	2	2	2	....	2	5	1	....
Religious	35	....	....	3	1	8	11	7	2	1	2
COMMUNITY											
Townships	12	1	1	4	....	2	1	....	1	2	....
Parish Areas	6	....	....	2	1	3	....	....	....	....	....
Rural Areas	16	2	2	1	1	2	2	4	2	....	....
All Rural Groups	84	3	4	12	5	17	14	13	10	4	2
Province	436	51	25	36	41	52	43	39	35	39	75

TABLE No. 4 — Continued from Previous Page

(a) Urban Groups (Membership Composed of Non-Farm Residents or Mostly So):

COMMON BOND	MEMBERSHIP (As of December 31)		TOTAL ASSETS (As of December 31)		No. OF BORROWERS DURING YEAR		AMOUNT OF LOANS MADE DURING YEAR	
OCCUPATIONAL	1948	1949	1948	1949	1948	1949	1948	1949
Industrial:								
Iron, Steel and Metal	6,291	9,133	$905,769.86	$1,646,628.42	5,416	7,770	$867,927.86	$1,719,619.23
Motor Vehicles	2,355	3,566	$273,263.12	$341,744.78	1,983	2,338	$213,288.35	$464,493.42
Printing	1,213	1,643	$161,286.18	$259,521.14	780	943	$184,682.53	$310,214.38
Foods	848	737	$53,904.41	$103,196.82	607	411	$103,643.65	$120,695.03
Paper Products	383	599	$22,398.65	$34,407.14	245	258	$39,642.65	$54,717.39
Pulp and Paper	908	1,086	$129,165.82	$179,130.89	385	422	$123,154.02	$163,757.25
Shipbuilding	297	286	$29,449.11	$27,849.38	44	78	$9,874.23	$12,124.88
Textiles	661	1,019	$72,379.05	$112,623.06	303	491	$70,800.42	$107,247.32
Chemicals	311	1,108	$8,842.48	$62,166.61	108	488	$8,346.48	$89,118.50
Electrical Equipment	1,599	2,600	$222,875.36	$310.064.20	712	1,211	$146,756.84	$344,465.12
Rubber	1,487	2,072	$109,267.98	$160,349.95	696	954	$146,420.47	$188,456.28
Soaps	819	1,117	$127,294.44	$233,438.86	555	510	$145,129.83	$273,054.27
Miscellaneous	5,926	7,787	$1,045,088.27	$1,513,237.52	3,877	4,964	$1,090,849.61	$1,486,664.68
Public Service:								
Federal	8,798	11,800	$1,167,990.64	$1,549,965.05	5,551	6,921	$1,441,159.91	$1,868,607.11
Provincial	696	929	$70,253.05	$100,799.17	309	327	$57,558.52	$93,648.55
Municipal	6,626	7,948	$1,400,450.45	$1,981,089.44	4,087	4,868	$1,421,179.03	$1,842,919.45
Teachers	804	962	$107,423.80	$149,978.15	328	403	$84,155.61	$112,791.47
Utilities:								
Power and Light	2,813	4,126	$460,741.60	$775,609.29	1,188	1,639	$530,206.70	$812,820.90
Telephone and Telegraph	2,413	3,448	$250,745.04	$342,301.55	1,257	1,708	$198,443.78	$341,053.63
Transportation	6,283	8,581	$720,183.77	$1,162,500.23	4,137	4,829	$791,484.44	$1,229,608.32
ASSOCIATIONAL								
Co-operatives	1,482	1,775	$123,908.21	$182,140.89	526	702	$142,491.45	$177,749.87
Racial	5,019	5,482	$1,147,630.28	$1,236,138.17	2,038	2,146	$1,141,299.52	$1,157,382.02
Religious	23,767	25,817	$6,088,973.62	$6,686,648.26	5,655	6,266	$2,555,871.50	$2,787,204.11
Others	908	951	$69,645.74	$89,323.21	275	305	$54,581.15	$66,535.76
COMMUNITY								
Towns	1,213	1,503	$107,944.29	$139,921.24	285	412	$94,689.55	$97,560.71
Villages	390	538	$25,313.17	$46,807.43	228	298	$36,594.46	$57,742.95
Townships	352	344	$30,171.75	$26,015.55	57	85	$16,039.03	$15,829.98
Neighborhood	1,648	1,853	$226,198.34	$263,833.10	1,022	749	$183,254.55	$167,341.46
Parish Areas	65	114	$2,473.23	$9,214.20	33	49	$3,345.00	$9,363.40
All Urban Groups	86,408	108,907	$15,132,478.17	$19,693,763.59	42,687	52,534	$11,934,404.50	$16,256,992.88
(b) Rural Groups (Membership Mostly Farm Resident):								
ASSOCIATIONAL								
Co-operatives	1,189	1,666	$157,257.72	$308,309.00	433	761	$180,002.19	$353,317.94
Religious	3,742	3,863	$533,235.29	$580,114.87	765	832	$349,326.76	$348,723.10
COMMUNITY								
Townships	1,487	1,326	$175,151.37	$179,584.76	314	283	$104,460.87	$98,114.81
Parish Areas	685	521	$103,539.16	$95,132.02	53	77	$55,541.66	$41,519.25
Rural Areas	2,240	2,377	$385,652.08	$520,465.79	594	710	$264,614.76	$325,481.94
All Rural Groups	9,343	9,753	$1,354,835.62	$1,683,606.44	2,159	2,663	$953,946.50	$1,217,157.04
Province	95,751	118,660	$16,487,313.79	$21,377,370.03	44,846	55,197	$12,888,350.74	$17,474,149.92

Appendix — Credit Unions

No.	Name	Group Served
385	The Oshawa Dominion Civil Servants' Credit Union Limited. Inc. Jan. 17, 1949	Employees of Dominion Government Oshawa, Ontario.
386	Chemical Workers' (Niagara Falls) Credit Union Limited. Inc. Jan. 21, 1949	Employees of North America Cyanamid Co. Ltd., Niagara Falls, Ont.
387	National Cash Register Employees' (Toronto) Credit Union Limited. Inc. Jan. 21, 1949	Employees of National Cash Register Co. of Canada, Toronto, Ontario.
388	Orillia District Telephone Employees' Credit Union Limited. Inc. Feb. 1, 1949	Employees of the Bell Telephone Co. in its Orillia, Ontario, district.
389	Carlton Street United Church (Toronto) Credit Union Limited. Inc. Feb. 14, 1949	Members and adherents of Carlton Street United Church, Toronto, Ontario.
390	Canadian National Telegraphs Employees' (Toronto) Credit Union Limited. Inc. Mar. 11, 1949	Employees of Canadian National Telegraphs, Toronto, Ontario.
391	Nathea (Toronto) Credit Union Limited. Inc. Mar. 11, 1949	Dominion employees in Family Allowances, Toronto, Ontario.
392	Ayr Co-operative Credit Union Limited. Inc. Mar. 11, 1949	Members of Ayr District Co-operative Association.
393	Verity's Employees' (Brantford) Credit Union Limited. Inc. Mar. 11, 1949	Employees in Verity plant of Massey-Harris Co. Ltd., Brantford, Ontario.
394	Co-operative Dry Cleaners' (Toronto) Credit Union Limited. Inc. Mar. 11, 1949	Members and employees of Co-operative Dry Cleaners, Toronto, Ontario.
395	Kitchener District Telephone Employees' Credit Union Limited. Inc. Mar. 25, 1949	Employees and their associations of the Bell Telephone Co. in its Kitchener District.
396	Fine Chemicals Employees' (Toronto) Credit Union Limited. Inc. Mar. 25, 1949	Employees of Fine Chemicals of Canada Ltd., Toronto, Ontario.
397	Toledo Scale Employees' (Windsor) Credit Union Limited. Inc. Mar. 25, 1949	Employees of Toledo Scale Co. of Canada, Windsor, Ontario.
398	Sudbury District C.P.R. Employees' Credit Union Limited. Inc. Mar. 25, 1949	C.P.R. employees in its Algoma, Ontario, district.
399	Hamilton C.N.R. Employees' Credit Union Limited. Inc. Mar. 25, 1949	C.N.R. employees, Hamilton, Ontario.
400	St. Margaret's Parish (New Toronto) Credit Union Limited. Inc. Mar. 25, 1949	Members of St. Margaret's Anglican Church, New Toronto, Ontario.
401	National Defence (Weston) Credit Union Limited. Inc. Mar. 25, 1949	Personnel of Dept. of National Defence at its No. 1 Supply Depot, Weston, Ont.
402	Royal Oak Dairy Employees' (Hamilton) Credit Union Limited. Inc. Mar. 25, 1949	Royal Oak Dairy employees, Hamilton, Ontario.
403	Gair Carton Employees' (Mt. Dennis) Credit Union Limited. Inc. Mar. 25, 1949	Gair Company (Canada) employees, Mt. Dennis, Ontario.
404	Beaverton Credit Union Limited. Inc. Apr. 5, 1949	Members of the Beaverton Co-operative Association.
405	St. Peter's Parish (London) Credit Union Limited. Inc. Apr. 5, 1949	Members of St. Peter's Parish, London, Ontario.
406	Sovereign Potters Employees' (Hamilton) Credit Union Limited. Inc. Apr. 5, 1949	Employees of Sovereign Potters Co., Hamilton, Ontario.
407	Hoover Employees' (Hamilton) Credit Union Limited. Inc. Apr. 11, 1949	Employees of Hoover Co., Hamilton, Ontario.
408	Postal Employees' (Ottawa) Credit Union Limited. Inc. Apr. 19, 1949	Postal Employees serving the City of Ottawa, Ont.

No.	Name	Group Served
409	Canadian National Railway Employees' (Sarnia) Credit Union Limited. Inc. Apr. 26, 1949	C.N.R. employees at Sarnia, Ontario.
410	Sparton Employees' (London) Credit Union Limited. Inc. Apr. 26, 1949	Employees of Sparton (Canada) Co. Ltd., London, Ontario.
411	London Free Press Employees' Credit Union Limited. Inc. Apr. 26, 1949	London Free Press Printing Co. employees, London, Ontario.
412	York Employees' Credit Union Limited. Inc. Apr. 26, 1949	Employees of the Corporation of the Township of York, York County, Ont.
413	Caisse Populaire St. Jean-de-Brebeuf (Sudbury) Limited. Inc. Apr. 26, 1949	Parishioners of St. Jean-de-Brebeuf, Sudbury, Ontario.
414	Windsor District C.N.R. Employees' Credit Union Limited. Inc. Apr. 26, 1949	Employees of the C.N.R. working in or out of Windsor, Ontario.
415	Ingersoll Machine Steelworkers' Credit Union Limited. Inc. Apr. 26, 1949	Employees of the Ingersoll Machine and Tool Company, Ingersoll, Ontario.
416	Inelco (Toronto) Credit Union Limited. Inc. Apr. 26, 1949	Members of the International Union of Elevator Constructors, Toronto, Ont.
417	Steelworkers' (Guelph) Credit Union Limited. Inc. Apr. 26, 1949	Persons employed in the Steel Industry in Guelph, Ontario.
418	Brockville Co-operative Credit Union Limited. Inc. May 18, 1949	Members of the Brockville Co-operative Association.
419	Hamilton Bridge Employees' Credit Union Limited. Inc. May 18, 1949	Hamilton Bridge Co. Employees, Hamilton, Ontario.
420	Cornwall Co-operative Credit Union Limited. Inc. May 18, 1950	Members of Cornwall District Co-operative Association.
421	Dominion Public Works Employees' (Toronto) Credit Union Limited. Inc. May 18, 1950	Employees of the Dominion Public Works Dept., and also Federal employees not attached to a specific department in Toronto, Ontario.
422	Neptune Employees' (Long Branch) Credit Union Limited. Inc. May 18, 1949	Neptune Meters Ltd., employees, Long Branch, Ont.
423	Sault Ste. Marie C.P.R. Employees' Credit Union Limited. Inc. May 31, 1949	C.P.R. employees in its Algoma District from, but not including Webbwood to Sault Ste. Marie.
424	Ukrainian (Grimsby) Credit Union Limited. Inc. May 31, 1949	Members of Ukrainian churches and the Ukrainian National Organization and persons of Ukrainian descent who are adherents of the aims and objects of the Ukrainian National Organization.
425	Morrow Steelworkers' (Ingersoll) Credit Union Limited. Inc. May 31, 1949	Morrow Screw and Nut Co. employees, Ingersoll, Ontario.
426	North Bay C.P.R. Employees' Credit Union Limited. Inc. June 3, 1949	C.P.R. employees' in the area from Mattawa to Sturgeon Falls.
427	Cellucotton Employees' (Niagara Falls) Credit Union Limited. Inc. June 15, 1949	Canadian Cellucotton Products Co. employees, Niagara Falls, Ontario.
428	Langley Employees' (Hamilton) Credit Union Limited. Inc. June 15, 1949	Employees of Langley's, Hamilton, Ont.
429	L.C.B.O. (Toronto) Credit Union Limited. Inc. June 15, 1949	Employees of the Liquor Control Board of Ontario.
430	London Dominion Civil Servants' Credit Union Limited. Inc. June 15, 1949	Employees of the Dominion Government in London, Ontario.
431	Richards-Wilcox Employees' (London) Credit Union Limited. Inc. July 26, 1949	Employees of Richards-Wilcox Canadian Co. Ltd., London, Ontario.

No.	Name	Group Served
432	Underwood Employees' (Toronto) Credit Union Limited. Inc. Aug. 8, 1949	Employees of Underwood Elliott Fisher Mfg. Co. Ltd., Toronto, Ontario.
433	Terrace Bay Community Credit Union Limited. Inc. Aug. 12, 1949	Residents of Terrace Bay or within five miles of the registered office.
434	Our Lady's Parish (Guelph) Credit Union Limited. Inc. Sep. 16, 1949	Parishioners of The Church of our Lady, Guelph, Ontario.
435	St. Clement's Parish (Preston) Credit Union Limited. Inc. Aug. 12, 1949	Parishioners of St. Clements Parish, Preston, Ontario.
436	Seiberling Employees' (Toronto) Credit Union Limited. Inc. Aug. 23, 1949	Seiberling Rubber Co. employees, Toronto, Ontario.
437	Ukrainian (Fort William) Credit Union Limited. Inc. Aug. 30, 1949	Persons of Ukranian origin, Fort William, Ontario.
438	International Silver Employees' (Niagara Falls) Credit Union Limited. Inc. Aug. 30, 1949	International Silver Co. employees, Niagara Falls, Ontario.
439	University of Toronto Employees' Credit Union Limited. Inc. Aug. 30, 1949	University of Toronto employees, Toronto, Ontario.
440	Caisse Populaire de Lavigne Limited. Inc. Sept. 29, 1949	Members of the Parish of Notre Dame de la Visitation, Lavigne, Ont.
441	Department of Transport (Toronto) Credit Union Limited. Inc. Oct. 20, 1949	Dominion employees in the Department of Transport, Toronto, Ontario.
442	English Electric Employees' (St. Catharines) Credit Union Limited. Inc. Oct. 20, 1949	English Electric Company (Canada) Ltd. employees, St. Catharines, Ontario.
443	Glomail Employees' (Toronto) Credit Union Limited. Inc. Oct. 20, 1949	Employees of the Globe and Mail Printing Co., Toronto, Ontario.
444	Meteorological Employees' (Toronto) Credit Union Limited. Inc. Oct. 20, 1949	Dominion employees, Meteorological Division, Toronto, Ontario.
445	St. Catharines Auto Workers' Credit Union Limited. Inc. Oct. 20, 1949	Plant employees of McKinnon's Industries Ltd., St. Catharines, Ontario.
446	St. Basil's Parish (Toronto) Credit Union Limited. Inc. Oct. 20, 1949	Members of St. Basil's Parish, Toronto, Ontario.
447	St. Alphonsus Parish (Peterborough) Credit Union Limited. Inc. Oct. 31, 1949	Members of St. Alphonsus Parish, Peterborough, Ontario.
448	Peterboro Telephone Employees' Credit Union Limited. Inc. Oct. 31, 1949	Employees of the Bell Telephone Co. of Canada at Peterborough, Ont.
449	Caisse Populaire St. Charles Boromee Limited. Inc. Nov. 9, 1949	Church of St. Charles parishioners, St. Charles, District of Sudbury, Ontario.
450	Holy Rosary Parish (Thorold) Credit Union Limited. Inc. Nov. 25, 1949	Holy Rosary parishioners, Thorold, Ontario.
451	Motor Products Corporation Employees' (Windsor) Credit Union Limited. Inc. Nov. 25, 1949	Employees of the Motor Products Corporation, Windsor, Ontario.
452	Windsor District C.P.R. Employees' Credit Union Limited. Inc. Dec. 15, 1949	Employees of the C.P.R. Co., Essex Terminal Railway Co. and Chesepeake and Ohio Railway Co. in the Windsor District, Ontario.
453	Marathon Credit Union Limited. Inc. Dec. 15, 1949	Residents of the Town of Marathon, Ontario.
454	Holy Family Parish (Blind River) Credit Union Limited. Inc. Dec. 22, 1949	Holy Family parishioners, Blind River, District of Algoma, Ontario.

No.	Name	Group Served
455	Hir-Walk Employees' (Windsor) Credit Union Limited. Inc. Dec. 22, 1949	Hir-Walk employees, Windsor, Ontario.
456	Holy Trinity Parish (Sudbury) Credit Union Limited. Inc. Dec. 29, 1949	Holy Trinity parishioners, Sudbury, Ontario.
457	Formco Plant 2 (Windsor) Credit Union Limited. Inc. Dec. 29, 1949	Formco, Plant 2, employees, Windsor, Ontario.
458	St. Mary's (Toronto) Credit Union Limited. Inc. Dec. 29, 1949	Members of the Church of Our Lady of Perpetual Help, Toronto, Ontario.
459	Experimental Farm (Ottawa) Credit Union Limited. Inc. Dec. 29, 1949	Employees of the Dominion Government at the Central Experimental Farm, Ottawa, Ontario.

CROPS, SEEDS AND WEEDS BRANCH

GENERAL CROP CONDITIONS

Extreme drought conditions throughout central part of the Province took an unusually severe toll in 1949 crop production. In some areas, there was no rainfall from seeding until after harvest. Hay was short, grain undeveloped and pastures were practically bare in many cases. The main turnip crop was almost a failure. Despite drought conditions, fall wheat produced surprisingly satisfactory yields. Fortunately, moisture conditions were more favourable during an unusually open fall. This revived pastures, saved on early winter feeding, produced an unusually good crop of corn for grain and silage, developed good crops of potatoes and late seeded roots. Soybeans and white beans produced above average yields. Crops in the northern and eastern sections of the Province did not suffer to such an extent by the drought.

In spite of an exceedingly dry season, grain production totalled 167 million bushels as compared to 187 million the previous year and the ten year average of 151 million bushels.

Field crops, not including fruit and vegetables, were valued at $343,940,000. For two succeeding years, total farm production exceeded a billion dollars annually.

CAMPAIGN FOR FEED GRAIN PRODUCTION

The campaign for an annual production of 200,000,000 bushels of home-grown grains was continued. Special emphasis was given on greater yields per acre by use of large, uniform seed of best varieties, properly treated for disease, seeded on well prepared land, provided with ample amounts of proper plant food. Special crop meetings, radio broadcasts, newspaper articles, periodic lists of seed for sale and crop publications were means used to develop interest.

SEED CLEANING PLANTS

There are now 372 custom plants and 27 private plants licensed.

The policy of assistance for installation of seed cleaning machinery was continued on a 50% basis of the invoice price up to a maximum grant of $250. During the year, grants were made on plants at Florence, Ivy, Shelburne, and for a portable plant at Sudbury. In addition, some plants enlarged their facilities or installed new equipment to make provision for an increase in business. As time would permit, visits were made to discuss services with plant operators and inspect efficiency of operation.

AGRICULTURAL LIMESTONE FREIGHT ASSISTANCE POLICY

The use of agricultural limestone continues to increase substantially in Ontario. The past year, ending March 31st, was the record year to date with 38,411 tons. This compares with 25,875 tons for the previous year or an increase of 48%. During the ten year period 1940-1949, the use of agricultural limestone as a soil conditioner has increased by 1,062%.

Encouraged by special county soils programmes, Wentworth and Essex Counties led last year in the use of agricultural limestone with 4,369 tons and 3,209 tons respectively. Brant is a close third with 3,146. Sudbury District leads Northern Ontario districts with 2,465 tons or 62 carloads. Combined districts of Muskoka and Parry Sound used 2,770 tons transported in 63 carloads. Only counties not to use agricultural limestone were Dundas, Durham, Kenora, Northumberland, Ontario, Manitoulin and Rainy River.

Tonnage transported by truck amounted to 17,373 tons.

Total amount paid out for movement of agricultural limestone in Ontario during the fiscal year 1949 was $37,065.17 of which $21,630.28 was refunded from Dominion Department of Agriculture, leaving a total cost to Ontario of $15,434.89.

WEED CONTROL

Weed Control Act

A new Weed Control Act was drafted and becomes effective in 1950. This is designed to simplify administration and further co-operation in eradication of noxious weeds.

Departmental assistance to the amount of $16,155.97 toward salaries and travelling expenses of county weed inspectors was paid on 50% of amount expended for the purpose. Townships in territorial districts are reimbursed to the extent of 50% of the salary of the township weed inspector, the amount not to exceed $50.

Weed Meetings

A meeting of all county weed inspectors was held in April at which time the following topics were considered:—

1. Administration of the Act.
2. Cultural methods of weed control.
3. Chemical methods of weed control.
4. Educational programme in connection with weeds.

An added feature of this meeting was the addition of a half day devoted to urban and suburban inspectors of Toronto and district.

Local meetings open to the public were held at various county points, stressing newer and more adequate means of weed control.

Demonstrations

Weed spraying demonstrations were held in every county and district. These included demonstrations of weed control in cereals, corn and pastures. Roadside demonstrations were also conducted on weeds and brush.

A new type of chemical was tested in Ontario for the first time last year. 2,4,5-T was used in combination with 2,4-D for brush and weeds resistant to 2,4-D. This material was effective on many forms of brush, also leafy spurge, goldenrod and poison ivy.

These demonstrations were possible largely because of Departmental trailer-mounted sprayers in charge of district weed inspectors. These machines are located in the districts of Toronto, Guelph, Magnetawan, New Liskeard, Cochrane, Richards Landing and Port Arthur.

Seed Drill Survey

In 1949, 325 samples of seeds were taken from seed drills in Eastern Ontario and analysed for weed seed content. In 1946, 570 samples were taken from seed drills in the same general area. The results show no improvement in the quality of seed being sown.

The 1949 survey indicated whether the seed being sown was farm cleaned, plant cleaned or uncleaned. The following table shows the results:

Grade	*Farm Cleaned* (152 samples)	*Cleaning Plant* (152 samples)	*Uncleaned* (21 samples)
No. 1	10%	56%	0
No. 2	8%	34%	0
No. 3	16%	7%	5%
Rejected	66%	14%	95%

This table indicates that 10% of the farm cleaned seed, 56% of the plant cleaned and 0 of the uncleaned seed graded No. 1. Ninety-five per cent of the uncleaned, 66% of the farm cleaned and 14% of the plant cleaned seed graded "rejected" or, on the basis of seed standards, does not meet the minimum standards of the Canada Seeds Act.

Advisory Committee on Herbicides

Due to variety of herbicides and the uses to which they may be put, the Advisory Committee on Herbicides each year summarizes the findings of Ontario weed workers and makes recommendations for the coming year based on those findings. This report is contained in Circular 75. Rapid developments in chemicals, such as 2,4,5-T, PMA, TCA and Potassium Cyanate have made annual revision of this publication a necessity.

ROYAL WINTER FAIR

An active part was taken on committees to promote, reclassify and arrange exhibits. In 1949, Ontario growers obtained 424 prizes at the Royal Winter Fair in crops section. These included 35 Firsts, 2 Championships, 3 Reserve Championships:—

Grand Championship, Potatoes .... Theodore Despatie, Hanmer
Championship, Table Stock Potatoes .... Arthur H. Budarick, Palmer Rapids
Reserve Championship—
  Table Stock Potatoes .... Frank Rick, Trout Creek
  Peas .... A. C. Douglas, Chippawa
  Barley .... J. E. Bradley, Stittsville

Many awards were won in the Boys' and Girls' Sections.

INTERNATIONAL GRAIN AND HAY SHOW

The policy to encourage Ontario exhibits on an international basis was continued as follows:—

(a) Assistance was provided in assembling and shipping exhibits. Shipping charges were paid on all approved exhibits to Chicago and return.

(b) $15.00 to each Ontario exhibitor winning a First prize.

(c) $5.00 to each Ontario exhibitor winning highest awards in the various classes, provided such exhibitor did not win a First prize in the same class.

Forty-six prizes were won by Ontario growers, including five Firsts, one Championship and two Reserve Championships.

Championship, Alfalfa .... Mac Gibbons, Admaston
Reserve Championships—
  Soybeans .... Wm. R. Beattie, Staples
  Peas .... Gustav Stein, Matheson

ONTARIO CROP IMPROVEMENT ASSOCIATION

An important decision was made at the annual Crop Improvement Association convention to direct more of the activity of the organization toward soil conservation and management. This resulted in a number of new projects, highlighted by Canada's first Conservation Day, and successful negotiations with Louis Bromfield, Malabar Farm, Lucas, Ohio, to address the 1950 Crop Improvement Association banquet.

Another decision of great importance made by the Directors was to change the date and place of annual meeting to the Coliseum in conjunction with the Ontario Farm Equipment Dealers' Show.

The three Grassland Days, the Wheatland Day, county Drainage Days, Spray Days, Crop Days and other special events continued to prove successful and attract large crowds.

Directors, Branch Secretaries and Presidents took an active part in formulating and presenting briefs to the Select Committee on Conservation. The Association's own brief offered the services and facilities of the organization in carrying out demonstrations which would keep before the public the many approved practices which can be incorporated into any farm programme for the protection, conservation and restoration of our soil and water resources.

During the year, the Seed Growers' Committee has made a careful study of organization problems in the hope of finding ways and means of providing greater service to the seed growers of Ontario and at the same time provide a closer relationship with the Canadian Seed Growers' Association. This work has resulted in definite recommendations presented at the 1950 annual meeting.

In the reorganization of the Ontario Fertilizer Advisory Board, the O.C.I.A. has been allowed two representatives in place of one on the Board.

Field demonstrations continue to be the major form of activity. Attention to field demonstrations is drawn through field meetings, plot tours and twilight meetings.

The success of the activities of the Association may be attributed to the following:—

1. The splendid co-operation of farmers and farm organizations.
2. The close association maintained with the Extension Service in that in most cases the Agricultural Representatives act as branch secretaries.
3. The excellent support extended to the Association by Federal and Provincial officials, by industrial organizations and by radio and the press.
4. The support, interest and assistance of the many branch officers and demonstration co-operators.

CANADA'S FIRST CONSERVATION DAY

The first of its kind to be held in Canada was organized by the Ontario County Branch of the Ontario Crop Improvement Association with substantial help from the county council, various Departments of the Ontario Agricultural College, the Crops, Seeds and Weeds Branch and Extension Service of the Department of Agriculture, and the co-operation and support of a large number of equipment companies and manufacturers of farm supplies.

The event was held on the farm of Heber Down, Brooklin, on September 8th. This farm was surveyed for contour tillage and a five-year crop plan provided. The first project was to plow on the contour all the land earmarked for fall wheat to be seeded in 1949.

The second project was to create a terrace or ridge to divert run off water.

The third project was to construct grassed waterways to prevent erosion.

Contouring the farm requires the removal of some inside fence rows. The fourth project had to do with grubbing out the brush and trees and removal of stone piles. The stones were used for levelling the barnyard to conserve the manure thus creating the sixth project.

Some of this farm is springy and 27,000 tile were required for drainage.

The barn was painted and the stables whitewashed. A new implement shed was erected. Some new fence was installed. Part of the permanent pasture was plowed, worked and reseeded with a special type of seeder designed by the Engineering Department, Ontario Agricultural College, Guelph.

The farm kitchen was remodelled and equipped with new labour-saving and step-saving gadgets, and the door yard was landscaped.

Barberry and buckthorn shrubs located in the farm were sprayed with chemical.

These were the major projects.

Equipment in use during the day included some 60 tractors with plows and other tillage equipment, five or six large bulldozers, several earth haulers, a buckeye ditcher, post hole diggers, weed and brush sprayers, fertilizer and lime spreaders and others.

Fifty Ontario County farmers, as well as a number of departmental men, acted on committees in organizing this event. The Central Committee had a budget of $3,000. All of the permanent improvements such as tile drainage, implement shed, kitchen fixtures, etc., were paid for by Mr. Down.

THE 1950 ANNUAL MEETING AND SEED DISPLAY

The 1950 annual meeting was held at the Coliseum, Exhibition Park, Toronto, on January 18th to 20th. There were special sessions on turnips, potatoes, registered seed and Northern Ontario. A potato luncheon with an attendance of 300 and an annual banquet with 800 were held. Louis Bromfield, Malabar Farm, Lucas, Ohio, was the banquet speaker. Many people were unable to secure tickets.

Each of the fifty-five branches of the Association is represented by an official delegate at the annual meeting, and many branches send in addition one or more delegates. These delegates have the responsibility of carrying back to their respective branches the material presented at the conference. The annual meeting is now looked on as the clearing house for all new ideas and advanced methods in field crop work.

All addresses were printed in booklet form and 20,000 copies were distributed. Requests were received for this publication from United States, England, Scotland, New Zealand and Norway.

The seed display, featuring county exhibits and individual lots of seed for sale, provided a splendid opportunity for the sale and purchase of seed. Catalogues listing seed for sale were available. Educational exhibits were appreciated.

CROP IMPROVEMENT PROJECTS

Total projects undertaken	389
Total number of co-operators	1,447
Approximate acreage under projects	4,800

PASTURE PROJECTS

Between 1944 and 1947, 2,071 long term pasture demonstrations were laid down on 488 farms. Sixty per cent of these plots are still in operation. Long term pastures have proven somewhat more successful in Western Ontario than in Eastern Ontario.

Commencing in 1948, 30 problem pasture plots were laid down, in some cases with remarkably successful results. Sixteen problem pasture plots were added in 1949.

Commencing in 1949, demonstrations on improved hay pasture mixtures were started with a total of 88 plots. Both the problem pasture and hay pasture demonstrations will be continued in 1950.

SPECIAL FIELD DAYS

Type of Field Day	*Place*	*Farm of*	*Attendance*
Grassland	Cornwall	County Home	2,000
Grassland	Peterborough	F. W. Rowland	2,000
Grassland	Thamesford		6,000
Wheatland	Gormley	Leitchcroft Farm	2,000
Conservation	Brooklin	Heber Down	12,000

SEED FAIRS AND DISPLAYS

Seed Fairs and Displays	32
Number of Exhibitors	1,183
Number of Entries	3,174
Attendance	22,430
Distributed in Prizes	$7,436.95
Cereals Offered for Sale (bushels)	78,044
Forage Seeds Offered for Sale (pounds)	41,800
Potatoes Offered for Sale (bags)	9,243

HIGH YIELD COMPETITIONS

FIVE HUNDRED BUSHEL POTATO CLUBS

Total Clubs	18
Total Contestants	350
Contestants with over 800 Bushels	2
Contestants with over 700 Bushels	7
Contestants with over 500 Bushels	60
Club with Highest Average Yield — Middlesex (bushels)	487
Contestant with Highest Yield—Frank Rick, Trout Creek (bushels)	836

FIFTY BUSHEL WINTER WHEAT CLUB

Seventeen counties with 234 competitors completed the competition. The 1949 Provincial winners are:

1.	Chas. E. Osborne	Bowmanville
2.	A. M. Sherwood	Freeman
3.	Alan Walper	Parkhill
4.	E. F. Metcalfe	Petrolia
5.	L. R. MacMillan	Norwood
6.	W. E. Breckon	Freeman
7.	R. K. Squair	Bowmanville
8.	Ronald Moyer	Grimsby
9.	W. B. Parnall	Drumbo
10.	Walter Pullen	Beachville

HIGH YIELD SOYBEAN COMPETITION

There were 85 competitors in four districts. The Provincial prize winners are:

1. Rosaire Rivait .... Comber (Essex)
2. A. E. Mann .... Fletcher (Kent)
3. Allistair Littlejohn .... Wallacetown (Elgin)

NATIONAL BARLEY CONTEST (Ontario Section)

The National Barley Contest was changed from a field and grain competition to a straight grain competition with a special class at each seed show. There were 96 entries. The first and second prize winners are eligible to compete in the championship class for provincial honours at the Ottawa Valley Seed Show.

BOYS' AND GIRLS' GRAIN AND POTATO CLUBS

The Crop Improvement Association trophies awarded to the highest ranking Grain and Potato Club teams at the 1949 Provincial Contest were won by:

Grain:

Ailsa Craig Grain Club .... Chas. Bannister, Ailsa Craig, R.R. No. 1
Jack McLaughlin, Port Hope, R.R. No. 1

Coaches — W. K. Riddell, W. T. Abraham, Dept. of Agriculture, London.

Potatoes:

Durham County Potato Club .... Elliott Dunbar, Port Hope
Lloyd Martin, Newcastle

Coaches — E. A. Summers, Sidney McDonald, Dept. of Agriculture, Bowmanville.

In the National Club Contests, both Ontario teams stood second with grain team one point and the potato team two points below the Dominion Champion teams.

DIRECTORS' MEETINGS

Four Directors', one Executive and twenty-one Committee meetings were held during the year.

POTATO IMPROVEMENT

Potato acreage in Ontario for 1949 amounted to 117,000 with an average yield of 160 bushels per acre, and a cash farm value of $21,341,000. This average estimated yield is the second highest on record for 65 years, and it is exceeded only by that of the previous year of 176 bushels per acre. Acreage, however, is considerably lower than fifty to sixty years ago. Three hundred and ninety farmers availed themselves of service provided free of charge by the Dominion Seed Potato Certification Service to have their fields inspected for seed purposes, and 2,460 acres met requirements. In 1949, there were 675 carloads shipped out of the Province and 4,188 carloads shipped into the Province. This compares with 733 carloads shipped out and 4,144 carloads brought in during 1948.

The Potato Committee, Ontario Crop Improvement Association, held three main meetings and several sub-committee meetings. Representation was also included on the Potato Committee, Canadian Horticultural Council. Visits were made by members of the Committee to field days and meetings in New York State for the purpose of making contacts and exchanging information.

GOODWILL TOUR

A Goodwill Tour to the potato growing areas of New Brunswick, Maine and Prince Edward Island was organized. Stops were also made in Quebec. Sixty-five persons, practically all potato growers and their wives, took the eight day trip. They travelled principally in three air-conditioned railway cars.

Hospitality and courtesy prevailed in abundance. The Quebec people provided sight-seeing tours in Quebec City and Montreal. Officials of New Brunswick Department of Agriculture met the party upon early morning arrival and supplied motor transportation for the entire party during three well-planned days; staff and officers of the Maine Department of Agriculture especially those at the Experimental Farm, Orono, gave freely of their time and information; Moncton Chamber of Commerce arranged a sight-seeing tour; Prince Edward Island gave two complimentary dinners, a general meeting and hour and a half tour by plane and also motor transportation for all to visit potato growers in various sections of the Island; the railway company, hotels and caterers supplied special menus, meals, and excellent sleeping accommodation. Press and radio gave excellent coverage.

HIGH YIELD CLUBS

By Area:

County or District	*No. Completing Contest*	*Over* 400 *Bus.*	*Over* 500 *Bus.*	*Over* 600 *Bus.*	*Over* 700 *Bus.*	*Over* 800 *Bus.*	*Average Bushels per Acre*
1. Algoma	17	10	1	--	--	--	394
2. Cochrane	19	14	7	3	1	--	460
3. Dufferin	40	28	9	--	--	--	433
4. Durham	30	14	6	--	--	--	419
5. Grenville	17	--	--	--	--	--	257
6. Kenora	10	--	--	--	--	--	282
7. Middlesex	34	22	14	11	3	1	487
8. Ontario	18	10	--	--	--	--	366
9. Parry Sound	18	9	5	3	2	1	445
10. Peel	13	5	2	--	--	--	375
11. Rainy River	9	4	1	--	--	--	316
12. Renfrew	12	3	1	--	--	--	342
13. Sudbury	20	10	3	--	--	--	390
14. Sudbury, Walford Div.	14	5	2	1	--	--	367
15. South Simcoe	33	5	--	--	--	--	321
16. Temiskaming	10	1	1	--	--	--	283
17. Thunder Bay	17	5	3	2	1	--	350
18. York	19	11	5	1	--	--	432
Total	350	156	60	21	7	2	373 Avr.

Ten clubs organized well attended banquets of potato growers. Eight Gold Watches were awarded, and total prize money would aggregate around $4,000. Certificates of Merit were provided to growers reaching the objective of 500 bushels per acre.

The Championship Award for Ontario was decided at the Royal Winter Fair, where 39 growers made entry in the final contest for Provincial honours, based on 200 points Yield per Acre; 200 points Quality per Acre; 100 points Exhibit of One Bushel; 100 points Cooking Test for Quality.

Top awards were as follows:

1. Frank Rick, Trout Creek, Parry Sound District $250
   (Plus trophy and trip to Toronto)
2. Dave C. Hackett, Cochrane, Cochrane District $125
3. W. A. Vail & Son, Denfield, Middlesex County 75
4. Ivan Linton, Strathroy, Middlesex County 40
5. Egon D. Anderson, Cochrane, Cochrane District 25
6. Jos. Gattie, Walford, Sudbury District 15
7. W. Irwin, Magnetawan, Parry Sound District 10
8. Alfred Anderson, Cochrane, Cochrane District 10
9. Herb Jones, Maple, York County .... Ribbon
10. Gabriel Kolometz, Dunning, Cochrane District .... Ribbon

FREIGHT ASSISTANCE ON SEED POTATOES FROM NORTHERN ONTARIO

In order to assist in the distribution of vigorous seed from the North to southern growers, and at the same time, provide suitable market outlets for crops to northern growers, a policy of freight assistance was arranged, whereby the Department paid one-half transportation costs of carload lots.

Several groups of growers took advantage of the service, and the policy is being continued.

BACTERIAL RING ROT SURVEY

For the seventh annual year a service of field inspection has been provided to detect bacterial ring rot in the potato crop. Efforts have been made to concentrate on specialized potato growing areas, which required services of eighteen part-time men for a few weeks. According to completed field reports, crops on approximately 2,250 farms or 26% were infected with ring rot. Seventy-three per cent of these farms on which ring rot was found this year were new cases and 8% had been free of ring rot for three years or more. Other statistics are as follows: crops of 1 grower had it 6 years; 3 had it 5 years; 8 had it 4 years; 30 had it 3 years and 86 had it 2 years. While marked progress has been made in some areas, the disease has become prevalent in others. One of the principal methods of infection is the use of second-hand bags.

GENERAL SUMMARY

Since Regulations:

	Infested Farms	*Infested* Acreage
1943	157	1,200
1944	463	2,800
1945	281	1,200
1946	673	3,640
1947	351	1,900
1948	246	1,200
1949	590	2,850

By Counties and Districts:

Area	1943	1944	1945	1946	1947	1948	1949
Algoma	--	--	--	1	7	--	--
Brant	--	2	--	17	1	3	3
Bruce	--	--	--	1	--	--	--
Carleton	--	9	--	44	6	13	26
Cochrane	--	--	1	1	22	20	45
Dufferin	61	73	15	34	7	11	217
Dundas	--	--	--	1	--	--	--
Durham	7	22	10	41	6	4	70
Elgin	--	--	--	1	--	--	--
Frontenac	--	--	--	--	--	1	--
Grenville	--	--	1	--	3	2	1
Grey	--	2	--	--	--	--	1
Halton	--	1	--	--	--	--	--
Huron	--	1	--	--	--	--	--
Kenora	1	--	--	1	--	--	--
Lincoln	--	1	--	--	--	--	--
Middlesex	--	6	5	5	--	--	4
Muskoka and Parry Sound	--	1	--	--	2	--	2
Nipissing	--	1	--	11	--	--	--
Norfolk	1	--	--	1	--	--	--
Northumberland	--	--	--	6	2	1	7
Ontario	7	2	3	33	8	21	30

Area	1943	1944	1945	1946	1947	1948	1949
Peel	8	13	22	2	1	3	5
Perth	--	1	--	--			
Peterborough	--	1	--	1	1		
Prescott and Russell	--	5	6	24	2	12	13
Rainy River	--	--	--	3	--	--	
Renfrew	--	1	--	2	1	3	7
Simcoe	58	171	62	178	108	100	91
Sudbury	1	54	122	183	128	21	25
Temiskaming	1	--	--	2	3	1	
Thunder Bay	--	--	2	23	21	1	6
Waterloo	--	13	1	8	--	12	2
Wellington	4	46	5	16	15	1	2
Wentworth	1	12	1	15	1	5	1
York	7	21	7	15	--	11	32

Upon receipt of "positive" report, each grower on the list was mailed a registered letter, advising that regulations respecting bacterial ring rot passed under the Plant Diseases Act, must be complied with. They are briefly as follows:—

1. Dispose of all potatoes by January 31st, 1950.
2. Mark each tag with "Table Stock Only."
3. Disinfect all bins, machinery, bags, etc., by April 1st, 1950.
4. Secure new seed from approved source.
5. Make a detailed report to head office.

While excellent co-operation was obtained in most cases, enforcement of the Act was necessary. Up to June 1st, sixteen growers had been prosecuted for failing to carry out regulations applied to their 1949 crop. Fines and costs amounted to $701.25. At least six additional cases are pending.

THE SEED POTATO ACT (1950)

At this year's sitting of the Ontario Legislative, the above bill was passed. The purpose of this Bill is to enable growers of seed potatoes to petition the township in which they grow potatoes or in territory without municipal organization to petition the Minister to establish restricted areas in order to control the kinds and grades of potatoes grown in such area and to control the spread of disease in potatoes.

This Act will prevent any action which may cause the introduction of potato diseases into an area set aside as a seed producing area and growers will be able after sufficient areas are established, to rely on a seed supply of incomparable cleanliness.

TURNIP IMPROVEMENT

The following statistics provide information regarding export shipments.

ONTARIO TURNIP EXPORTS

Crop Year	*Total Bushels*	*Plain*	*Waxed*	*% Waxed*
1943	2,629,201	1,491,089	1,202,793	44.6
1944	2,548,776	1,433,434	1,115,341	43.7
1945	2,341,225	1,038,971	1,302,254	55.6
1946	2,552,575	1,178,919	1,373,656	53.8
1947	1,887,252	928,479	958,773	50.8
1948	1,674,349	694,409	979,940	58.5
1949 up to Feb. 28	783,747	184,901	598,846	76.4

ONTARIO TURNIP EXPORT

	CARS			TRUCKS			
	Number	*Bushels*	*% Waxed*	*Number*	*Bushels*	*% Waxed*	*% Movement*
1943	3500	2,629,201		263	64,681	78.	2.4
1944	3229	2,499,093		202	49,682	77.2	1.95
1945	3175	2,279,830		261	61,395	78.2	2.6
1946	3368	2,443,836	53.4	449	108,739	62.5	4.25
1947	2503	1,741,603	48.9	402	145,649	72.6	7.71
1948	2400	1,452,973	56.7	547	221,376	70.5	13.22
1949	885	544,987	77.	505	238,760	77.	30.

The 1949 season was handicapped by severe drought until August, and the worst plague of aphids in history. There was almost complete crop failure of seedings made up to the middle of July. However, advantage of an opportunity was taken to pursue extensive studies in insect control with new chemicals to prevent further crop failure due to aphid injury. As a result, parathion is being recommended with warning being given of the hazard involved.

Another important development during the year concerns seed supplies of registered Laurentian variety, properly sized and treated for brown rot. An arrangement was made direct with producers in New Brunswick to take all supplies available from 1949 crop and a definite contract was arranged for 3,000 pounds, properly packaged and labelled from crop in 1950. Negotiations were also undertaken with seed producers in other areas in order to alleviate a serious shortage of seed which developed, apparently due to low prices which forced producers out of business.

Constant attention has been given by the Turnip Committee to such subjects as fertility tests, prevention of water core, control of maggots, grades and enforcement, transportation by rail and truck including rates, advertising, exhibits at fairs and exhibitions, turnip clubs, production practices, distribution of information, publicity, precision seeding, increased consumption, etc. Uppermost in their minds has been improvement of quality. For the first time in history, waxing plants purchased carload lots for more than $1.00 per bushel, and for several weeks the general wholesale to retail price ranged from $2.00 to $3.00 per bushel. It was observed that individual specimens on retail counters were priced as high as 48c each. Practically no water core occurred in Ontario turnips in 1949 due apparently to growth late in season, with abundant moisture.

Two regular committee meetings of the Turnip Section, O.C.I.A., were held.

SEED MARKETING AND PUBLICITY COMMITTEE

The main work of the nine seed growers and four departmental officials who constitute this committee was as follows:—

1. Survey and report on yields and distribution of seed supplies.
2. Encourage production of high quality seed and promote markets for same.
3. Establish minimum suggested prices for various grades and varieties of fall wheat, rye, oats and barley and distribute information.
4. Collect and prepare material for booklet "Your 1950 Seed List" in which registered seed growers are given an opportunity to list their supplies. Distribute 10,000 copies.
5. Pass out warnings re Dwarf Bunt Smut in winter wheat.
6. Promote production of more fall wheat, spring grains and forage crop seeds.

RADIO AND PRESS

Again, throughout the year, a series of weekly crop programmes was arranged and carried out in co-operation with C.B.C. Farm Broadcast Department. These

consisted mostly of interviews with practical successful farmers and departmental officials. In addition, periodic, timely releases were continually being made and widely distributed to radio and press. Several special radio interviews were made on such stations as London, Fort William, CFRB Toronto, Wingham, Guelph, Barrie, Brockville, Ottawa, Cornwall, Hamilton and others. Contributions on crop subjects were made to farm press and for several special numbers of daily or weekly papers.

EXHIBITS

Educational exhibits from the Branch were featured at a large number of seed fairs and fall fairs, also at the International Plowing Match. In each case, an attendant was available to discuss crop subjects and provide suitable literature.

GENERAL

Office duties, consisting of correspondence, reports, interviews, phone calls, required much time as demands for service and duties of administration seem to be on the increase. Demands continue for speaking engagements at crop meetings, banquets, service clubs, etc. There is a certain amount of inspection and work of supervision, all of which require considerable travelling. Judging high yield competitions through the Province, seed classes at fairs and exhibitions, coaching and instruction to Junior Farmers, required considerable time. Activities of committees are a major requirement of time and attention, all keeping in mind the progressive development of Agriculture with particular attention to crops of this Province.

DAIRY BRANCH

For the first time since the war the Ontario Government did not pay a subsidy on dairy products, although $450,000 was voted to The Ontario Cheese Producers' Association to assist in building cheese storages.

The end of the previous fiscal year saw the last of the wartime ceiling price control on dairy products when it was removed on butter. On April 1, 1949, the Dominion Government Prices Support Act applied to butter, and to cheese later in the season when the British contract was filled.

The floor price on creamery butter in Ontario was 58 cents per pound. The Dominion Dairy Products Board purchased butter tendered to them at this price provided it was of first grade quality. This also meant that it must be packaged according to export specifications under The Dominion Dairy Industry Act.

Butter of second grade quality or lower became an apparent glut on the market and until late in August was difficult to move at any price. However, butter of first grade quality, but not meeting first grade standards for package, sold fairly freely at around 1½ cents below the floor price. Some operators offered first grade print butter for sale to retailers at as low as 56 cents per pound. This resulted in first grade butterfat remaining at 58 cents per pound in many sections and in other sections 59 cents for the high production season. Because of this so called price cutting, The Ontario Cream Producers Marketing Board asked their Negotiation Committee which was composed of producers and operators, to study the possibility of establishing a minimum price for butterfat under their Scheme.

Toward the end of the high production season The Dairy Products Board announced their policy of selling their butter, and butter prices then rose above the floor price, with subsequent increases in butterfat prices.

The two main factors responsible for the decline in butter prices in 1949 as compared with 1948 were — First, the large quantity of low quality butter on the market at the beginning of the year. Several million pounds of butter were imported from Denmark which was not satisfactory for the Canadian market. Second, the introduction and sale of margarine in Canada at the beginning of the year. The legislature during the 1949 session passed The Oleomargarine Act to control the manufacture and sale of margarine in Ontario. The administration of this Act is the responsibility of the Dairy Branch.

Cheese prices were down slightly as compared with the previous year. The export price was 30 cents per pound, factory shipping point, the same as the previous year, but early in the season when production was low cheese sold at 32 cents and higher. The Dominion Government did not requisition cheese and consequently there was a domestic market, especially for coloured cheese during the heavy production season. When the British contract of fifty million pounds was filled the Dominion Government continued to purchase cheese at 30 cents per pound to stabilize the prices, which had shown signs of weakening.

Cheddar cheese production increased approximately 22 per cent over the previous year. This increase was largely due to diversion of milk from concentrated milk plants, when for the first time since the war this market appeared to have more milk than required.

The production of concentrated milk products declined slightly more than 11 per cent. Sales of fluid milk and cream increased approximately one per cent. Creamery butter production was only slightly lower than the previous

year. The quality of first grade butter produced was the best on record according to federal butter grading returns.

One of the creamery instructors, Mr. C. A. Davies, retired on superannuation on May 31st, 1949, after having served in the Dairy Branch for twenty-six years. He was on the staff of the Ontario Butter Grading Station until it closed in 1932. Since that time he was the instructor and inspector of the Toronto-Peterborough group of creameries and milk manufacturing plants. Mr. H. M. Arbuckle, a graduate of the Ontario Agricultural College, was appointed an instructor and inspector of dairy plants to succeed Mr. Davies. Mr. Arbuckle specialized in dairying at the Ontario Agricultural College, Guelph.

Dairy Branch Field Staff:

The field staff of the Dairy Branch in 1949 consisted of two chief instructors and inspectors of dairy plants who have supervision of cheese factory instruction and inspection — one covering Western and Central Ontario and one for Eastern Ontario.

Thirty-seven instructors and inspectors of dairy plants are employed. Twenty-five of these men have supervision over cheese factories, nine have supervision over creameries and to some extent milk manufacturing plants while three in Northern Ontario have supervision over both cheese factories and creameries and also act as fieldmen for the Milk Control Board. Two of these three men are employed by the Dairy Branch and one by the Milk Control Board.

The Assistant Director has supervision over the instructors and inspectors of creameries and milk manufacturing plants.

Dairy Plant Licences issued under the Dairy Products Act 1938:

	1948	*1949*
Creameries	260	248
Cheese Factories	447	423
Combined Plants	20	18
	727	689

Production of Cheese in Ontario:

	1948	*1949*
Western Ontario	10,791,256 lbs.	13,548,716 lbs.
Central Ontario	12,321,541 "	14,980,096 "
Eastern Ontario	42,583,518 "	53,064,526 "
Northern Ontario	839,139 "	791,500 "

For the past three years Ontario has made approximately three-quarters of all cheddar cheese made in Canada. Of the total Canadian production of cheese, Ontario made 61.5 per cent in 1945 — 65.3 per cent in 1946 — 73.0 per cent in 1947 — 76.7 per cent in 1948 and 73.2 per cent in 1949.

Cheese Factory Summary:

	1948	*1949*
Number of factories operating	452	425
Number of patrons	19,341	20,285
Average per cent fat in milk	3.37	3.31
Average pounds milk to make pound of cheese	11.29	11.64
Average pounds cheese per pound of fat	2.62	2.57
Price per pound of cheese (provincial subsidy included in 1948)	32.234c	30.82c
Dominion premium per pound of cheese	1.08c	1.04c
Money spent on factory improvements	$459,033.00	$383,955.00

Cheesemakers' Certificates Issued:

	1st Class	2nd Class	Permits	Beginners' Permits	Special Permits	Totals
1948	351	112	37	37	8	545
1949	303	104	42	21	4	475

Federal Grading of Ontario Cheese:

	No. Boxes Graded	1st Grade Per Cent	2nd Grade Per Cent	3rd Grade Per Cent	Below 3rd Grade Per Cent	Average Score
Western Ontario	136,613	96.42	3.52	0.06	----	92.691
Central Ontario	211,772	95.83	4.02	0.13	0.02	92.960
Eastern Ontario	505,210	95.83	4.02	0.14	0.01	92.953
Northern Ontario	6,447	73.88	23.90	2.02	0.02	91.278
Totals, 1949	860,042	95.76	4.09	0.14	0.01	92.900
Totals, 1948	718,096	95.01	4.80	0.18	0.01	92.920

Score of Ontario Cheese:

94 score and higher received a Dominion Premium of 2 cents per lb.

93 score received a Dominion Premium of 1 cent per lb.

	94 Score and Over Per Cent	93 Score Per Cent	92 Score Per Cent	Below 92 Score, Under 1st Grade Per Cent
1948	33.96	40.09	20.96	4.99
1949	30.30	43.41	22.05	4.24

Cheese Factory Instruction:

During the past ten years there has been a decrease in the number of cheese factories in the province. In 1939, there were 659 plants in the province making cheddar cheese as compared with 467 in 1949. It was, therefore, felt advisable to decrease the number of cheese instructors in the province, with the result that as the older members of the staff reached retirement age they were not replaced. The cheese instruction staff has been reduced from 28 members in 1948 to 25 in 1949.

The decrease in the number of cheese factories is due largely to the amalgamation of cheese factories, especially in the Eastern part of the province where several of the smaller plants have been replaced by modern, well-equipped plants. The amalgamation of cheese factories is still taking place and has spread to Central Ontario where arrangements were made in 1949 for the amalgamation of four smaller plants, to be replaced by one modern plant. The amalgamation of cheese factories has been encouraged by this branch and every assistance given by supplying plans and specifications for modern cheese factories. A few of the smaller plants in the province were closed permanently in 1949, although the number closed was not as great as in 1948. The increase in the amount of milk sent to cheese factories in 1949 encouraged the smaller plants to continue to operate.

Although the number of cheese factories have been decreasing over the past years, it does not necessarily mean that the industry is going back. The condition of these plants is improving each year. The general appearance both inside and outside shows much improvement. More modern equipment is being installed. Labour saving devices which have improved sanitary conditions are now to be found in many of the plants. The general condition of the cheese manufacturing plants indicates a more healthy and prosperous industry than when most of the plants were small and poorly equipped. Approximately

90 per cent of the cheese factories have mechanically cooled curing rooms where the cheese can be held at the proper temperature during the warmest summer weather. This has been of great advantage in keeping the cheese in good condition until disposal has been made.

During the year the extraneous matter testing of cheese was carried on extensively. The instructors obtained the samples of cheese at the cheese factories or grading centres. The tests were made at the Dairy Department of the Ontario Agricultural College and the Dairy Department of the Kemptville Agricultural School. Samples were taken from each factory each month during the period of May to September. The results obtained were encouraging and showed a substantial gain of clean and fairly clean cheese as compared with the previous year. Approximately 90 per cent of the cheese tested was clean or fairly clean or the type of cheese which is suitable for any market in the world.

The usual quality tests were made of milk by the instructors as it arrived at the factory. They paid special attention to the flavour and cleanliness of the milk. They made 54,416 sediment tests — 31,375 methylene blue tests and 14,269 fermentation tests. Patrons who had poor flavoured milk were visited by the instructors who made 2,546 visits to patrons during the season. The results of the sediment tests made of the milk would indicate that there is still a considerable quantity of milk going to milk plants that is below the classification of clean or fairly clean and that many producers are not endeavouring to keep sediment out of milk. Although there has been an improvement in the extraneous matter content of cheese, this improvement has been brought about by improved milk straining conditions at the factory more so than by clean milk production by producers.

Two new trophies have been donated for competition of the cheesemakers in Ontario — The Publow Trophy presented by Dr. Publow of Picton in memory of the late G. G. Publow who was connected with the cheese instruction work for many years in Central and Eastern Ontario. This trophy is to be presented annually to the cheesemaker having the highest average score in workmanship, condition of factory and highest average score for cheese for the period from May 1st to October 31st. The trophy was won by Howard Andrews of the Pine Grove Cheese Factory at Lakefield in 1949.

The Frank Herns Trophy, presented by the cheesemakers of Western Ontario in memory of the late Frank Herns who was connected with cheese and butter instruction work in Western Ontario for many years, is to be awarded annually to the cheesemaker in Ontario who wins the highest number of points for prizes won in the open classes for exhibition cheese at the major cheese shows held in Ontario. This trophy was won in 1949 by Mr. T. S. Aicken of the Blanshard and Nissouri Cheese Factory at Belton, Ontario.

Production of Creamery Butter in Ontario:

	1948	1949
Western Ontario	46,181,583 lbs.	47,009,871 lbs.
Central Ontario	13,165,745 "	12,314,116 "
Eastern Ontario	10,954,216 "	11,233,257 "
Northern Ontario	4,160,937 "	3,958,407 "
Total	74,462,481 "	74,515,651 "

For the past several years Ontario has produced a little more than one-quarter of Canada's creamery butter. The percentages of Canada's creamery butter produced in Ontario for the past four years are: 1946 — 25.1 per cent, 1947 — 26.4 per cent, 1948 — 26.2 per cent, and for 1949 — 26.7 per cent.

Butter Quality:

Fifty-four per cent of Ontario's creamery butter was graded officially in 1949 compared with 47 per cent in 1948. This is the highest percentage of the total production ever graded. Of the butter graded, another increase in the quantity of first grade butter is recorded, to again establish a new high over that established in 1948. The increase in quantity of butter graded can be partly attributed to the Dominion floor price in that more creameries had their butter graded to be sold to the Dairy Products Board. These creameries in previous years stored this portion of their make for future use without having it graded.

The increase in the quantity of first grade butter can also be attributed in part to the floor price since those creameries tendering butter to the Dairy Products Board made reasonably sure it was of first grade quality before having it graded. Those creameries which have all their butter graded continued to record a higher than average figure for first grade butter.

There was a further marked decline in the quantity of high scoring first grade butter reported.

Federal Grading of Ontario Butter:

	Total Boxes Graded	Per Cent 1st Grade	Per Cent 2nd Grade	Per Cent 3rd Grade	Per Cent Below 3rd Grade	Per Cent Scoring 93 points or higher
1948	523,882	84.99 (89.38)	12.60 (8.21)	1.98	0.43	6.50
1949	613,924	85.99 (91.27)	12.49 (7.21)	1.19	0.33	2.89

The figures in brackets indicate what the quality would have been had all the butter been properly packaged to meet first grade specifications. A small portion was also lowered to second grade because operators failed to advise the graders of the consumer salt requirements of their butter.

Cream Quality:

Cream quality as found by the instructors and inspectors at the creameries is as follows:

	Sp. Grade Per Cent	1st Grade Per Cent	2nd Grade Per Cent	Off Grade Per Cent
1948	4.06	88.82	7.09	0.03
1949	3.60	90.00	6.30	0.10

While it was gratifying to find a decline in the amount of second grade cream, the quality of first grade cream did not show any marked improvement. Too many producers appear content to produce cream which just meets the minimum requirements for first grade. A little more attention to the care of the cream, particularly cooling, would result in a marked improvement in the quality of their first grade cream.

Creamery Statistical Summary:

	1948	1949
No. of creameries operating	265	260
No. of patrons	68,829	66,943
Average per cent of fat in the cream	32.3	32.7
No. of creameries making cheddar cheese	15	17
No. of creameries making powdered & condensed milk	24	23
No. of creameries making whey butter	34	33
No. of creameries also milk distributors	91	83
No. of creameries with locker storages	90	95

	1948	1949
No. of creameries making butter only:		
(a) with no other associated product	42	38
(b) with no other dairy product	125	119
Average price of first grade butter (solids)	67.12	59.22
Average price of first grade butterfat (net the producer)	73.02	60.85
Approximate per cent cream delivered to creameries by producers	32.3	33.9

Buttermakers' Certificates Issued:

	First Class	Second Class	Permits	Beginners' Permits	Special Permits	Total
1948	218	24	1	26	6	275
1949	228	21	3	20	6	278

Milk Manufacturing Plant Statistical Summary:

	1948	1949
No. of plants (including receiving plants)	53	53
No. of patrons	14,200	14,500
Average per cent fat in milk	3.55	3.56
Approximate pounds butter made (milk patrons only)	8,070,000	8,720,000

Production of Concentrated Milk:

	1948		1949	
Condensed Whole Milk	17,896,330	lbs.	14,163,196	lbs.
Evaporated Whole Milk	128,338,804	"	100,421,708	"
Whole Milk Powder Spray Process	8,628,331	"	7,711,546	"
Whole Milk Powder Roller Process	5,190,788	"	3,310,394	"
Condensed Skim Milk	4,442,966	"	3,423,657	"
Evaporated Skim Milk	4,378,874	"	7,755,591	"
Powdered Skim Milk	26,816,483	"	28,983,434	"
Condensed Buttermilk	2,703,660	"	3,356,528	"
Powdered Buttermilk	1,781,986	"	2,564,571	"
Powdered Skim Milk (feed only)	1,009,412	"	1,113,467	"
Casein	957,990	"	954,060	"
Other Products	4,558,814	"	9,983,947	"
Total	206,704,438	"	183,742,099	"

Milk Utilization in Ontario Dairy Plants:

Milk received at dairy plants in Ontario was utilized approximately as follows:

	1948	1949
Creamery Butter	37.5%	36.6%
Cheddar Cheese	16.3	19.4
Other Cheese	0.5	0.4
Fluid Milk	29.7	29.1
Fluid Cream	3.5	3.1
Condensed Whole Milk	0.9	0.7
Evaporated Whole Milk	6.2	4.6
Powdered Whole Milk (including malted & baby foods)	2.3	1.9
Ice Cream	3.1	3.6

Approximately 83 per cent of the total milk production of Ontario is sold to plants for processing and fluid sales. Milk received at plants was up 2.3 per cent from 1948.

One third of Canada's total milk production is produced in Ontario.

Approximately 11 per cent of the milk used for butter, the skim milk from most of the fluid cream and ice cream is also manufactured into by-products chiefly skim powder.

Butter Quality Improvement Competitionss

The Quality Improvement Competitions sponsored by The Ontario Creamery Association were conducted for the fifth consecutive year under the supervision of the Dairy Branch. The Dairy Department of the Ontario Agricultural College co-operated in making the yeast and mould analysis of the butter and in storing and making the various tests on the butter in the Keeping Quality Competition. The Dominion Dairy Produce Graders did all the grading of the butter.

The main object of these competitions is to improve the quality of Ontario butter. Since these competitions were started in 1945 the quantity of first grade butter produced in Ontario has been raised from less than 60 per cent in 1944 to 86 per cent in 1949. Creameries in the competition, which have all their butter graded, averaged 90 per cent of their butter first grade, compared with 80 per cent first grade for the balance of the province.

Approximately one-third of the creameries in the province were entered in 1949.

The trophies and cash prizes in these competitions were donated by various dairy supply companies, the Ontario Cream Producers' Marketing Board and the Ontario Creamery Association.

The Grand Championship Winners and the Runners-up in each competition were:

Quality Competition —

Villa Nova Milk Products Co-operative, Waterford, Ontario,
100 per cent first grade butter (manufactured 109,642 lbs. 93 score butter).
Canada Packers Ltd., Clinton, Ontario,
100 per cent first grade butter (manufactured 22,549 lbs, 93 score butter),
Borden Co. Ltd., Toronto, Ontario,
100 per cent first grade butter (manufactured 15,782 lbs. 93 score butter).
Barrie Creamery, Barrie, Ontario,
100 per cent first grade butter (manufactured 3,282 lbs. 93 score butter).

Yeast and Mould Competition —

Barrie Creamery, Barrie, Ontario	average count 0.72
Silverwood Dairies, Lindsay, Ontario	" " 0.88
Canada Packers Ltd., Shelburne, Ontario	" " 4.04

Workmanship Competition —

Canada Packers Ltd., Wiarton, Ontario	87.40 points
Canada Packers Ltd., Centralia, Ontario	82.28 "
Canada Packers Ltd., Shelburne, Ontario	82.09 "

Combined Quality, Yeast and Mould, and Workmanship Competition —

Barrie Creamery, Barrie, Ontario	273.09 points
Canada Packers Ltd., Shelburne, Ontario	265.49 "
Canada Packers Ltd., Centralia, Ontario	263.19 "

Keeping Quality Competition (Storage Butter) —

Silverwood Dairies, Caledonia, Ontario	90.542 points
Canada Packers, Shelburne, Ontario	90.333 "
New Dundee Co-operative Creamery, New Dundee	90,167 "

Instruction and Inspection of Creameries and Milk Manufacturing Plants:

For the first time in years there was a re-awakening of interest in improving the quality of cream and butter by both operators and producers. The creamery

instruction staff devoted the major part of their spring conference to formulating a new quality improvement programme.

The programme was started immediately as a joint effort with the Ontario Cream Producers' Association and the Ontario Creamery Association.

In co-operation with the Dairy Department staff of the Ontario Agricultural College a special conference of operators, buttermakers and producers was held early in April. This conference was very well attended and was highlighted by a panel discussion on quality improvement and merchandising in which specialists in their particular fields took part.

During the months of April and May the entire industry put forth a very intensive drive on quality improvement. Meetings of producers were held in many sections of the province. Several creameries appealed to their producers for better quality through radio stations which had large rural coverage. Every producer was supplied with information prepared by the Dairy Branch and the Ontario Cream Producers' Association on ways and means of improving the quality of their cream. Many low quality producers were visited by the creamery instructors.

It was definitely established that the very poor cream producer had less than five cows. The production of cream was of little importance to them and for the most part indicated little interest in quality improvement. On the other hand, the larger producer was definitely interested in the quality of his cream. Many were surprised that their quality all of a sudden was not satisfactory. In the majority of instances more attention to cooling methods on the farm could bring a marked improvement in quality. Most encouraging results in this regard came from Northern Ontario.

Second grade cream was definitely not wanted by the majority of operators. The prices paid for second grade cream dropped from the usual minimum of three cents per pound below first grade fat to ten cents, fifteen cents and as much as thirty cents. Many other operators refused to accept cream below first grade in quality. This was particularly true in the Upper Ottawa Valley.

When the period of peak production arrived, together with the removal of surplus butter through the government floor price plan, there unfortunately was a definite relaxation in the quality drive on the part of the operators in the highly competitive areas.

A special midsummer conference of the creamery instruction staff was held at the end of June to take stock of the progress made to date and plan their programme for the balance of the year.

A special conference of the executives of the Ontario Cream Producers and the Ontario Creamery Association, together with representatives of the Dairy Branch was held early in July, at which time the Dairy Branch presented their observations to date on the quality programme. This conference culminated in the appointment of a Quality Improvement Committee to be equally represented by the three groups.

The personnel of this committee was: Jas. Gifford, L. Davis, and R. W. Morrison for The Cream Producers' Association; R. E. Drope, H. H. Leslie and R. Potter for the Creamery Association; and J. C. Palmer, P. S. MacDougall and J. L. Baker for the Dairy Branch, with the latter acting as Chairman. Three meetings of the committee were held. The deliberations appeared to establish the fact that general overall quality programme was not satisfactory without modification to the peculiarities of the different sections of the province.

Any quality improvement programme must be a long time project. The committee did make some specific recommendations, namely:

1. In a quality programme emphasis should be placed on improving the quality of first grade cream.

2. All cream should arrive at the creamery not later than 4 p.m. each day.

3. That definite attention be given to quality of milk received at plants, particularly where the fat from this milk goes into butter.

4. That the industry put on educational displays pertaining to the production of high quality milk and cream, at fairs, agricultural field days, ploughing matches and other agricultural gatherings where producers go voluntarily.

Despite a somewhat indifferent attitude during the last half of the year on the part of some operators and many producers, the creamery instruction staff was satisfied that their extra effort for quality did result in more first grade butter and very definitely resulted in the consumer getting better butter during the winter season.

The creamery instruction staff was pleased to co-operate with the Ontario Cream Producers' Association in supervising the manufacture of the butter used in modelling "Bessie the Butter Cow," "Buttercup her calf" and "Barbara the Dairy Maid" at the Canadian National Exhibition and the Royal Winter Fair.

Several Ontario creameries again exhibited butter at the major exhibitions and made a creditable showing.

Mechanical defects in butter, particularly uneven colour and poor texture in prints increased over the previous year. This increase was largely centred in creameries not regularly having their butter graded. Improper attention to the tempering of the butter for mechanical printers was the chief contributing cause for these defects.

The newer mechanical printers and wrappers now permit the printing of butter directly from the churn. The creameries with these machines printing their butter in this manner very definitely are giving the consumer a butter with the desired body and texture to be found in good butter.

With few exceptions, the testing of milk and cream in the plants was satisfactory. In two sections instructors had some difficulty in getting creameries to identify properly their patrons' cream samples. During the year the instructors made 368 cream test adjustments and 91 milk test adjustments to producers.

During the year the few manufacturing plants which were testing composite milk samples once a month switched to twice a month testing periods. The care of composite milk samples in all manufacturing plants was improved.

Some of the independent manufacturing plants became definitely interested in improving the quality of the milk of their patrons. Fieldmen were engaged by two plants.

Eleven buttermakers' clubs were active during the year.

Oleomargarine:

In 1949, the manufacture and sale of margarine was allowed in Canada and the manufacture of this product commenced in Ontario.

An Act Respecting Oleomargarine was passed by the Ontario Legislature and became effective on April 1st, 1949. This Act and Regulations passed thereunder is administered by the Dairy Branch. The creamery instructors obtain samples of margarine at the various stores throughout the province. All samples found to be over the legal limit of 16 per cent water have been forwarded to the Ontario Research Foundation for moisture and total solids analysis.

Our inspectors also inspected restaurants and hotels to enforce the Act in respect to margarine being served in public eating places.

Plants manufacturing margarine are licensed by the province as well as wholesale establishments which wholesale margarine.

Number of licensed manufacturers in Ontario, 1949	10
Number of licensed wholesalers in Ontario, 1949	146

FARM ECONOMICS BRANCH

FORWARD

Farm economics deals with the business end of farming. It is concerned with farm problems; where the money comes from and where it goes. It is concerned with farm practices, crops and livestock to the extent that they affect the net earnings of farm operators. The Economics Branch makes its contribubution to a more prosperous and efficient agriculture through the analysis of farm business records and by making this pooled experience of farm operators available to those who can use it best. An important purpose also lies in promoting a better public understanding of what the problems of agriculture are.

This Branch is only two years old but its work is already being well received by the farmers of the Province. During the past year over 1,500 individual farmers were keeping cost records; fourteen major organizations used the Branch in a consultive capacity in connection with their farm business problems; speakers on farm business subjects were requested for 44 meetings and short courses; and over 20,000 copies of the preliminary report on hog costs alone were distributed to swine producers.

METHOD USED IN FARM BUSINESS STUDIES

The method used by the Branch in studying farm business problems is the one in general use throughout the English speaking world. The farm product to be studied, or the problem to be investigated, is defined as clearly as possible and the co-operation of a representative group of farmers producing the product affected by the problems concerned is obtained.

With some assistance from a Branch Fieldman, the co-operating farmers keep complete financial and production records for the period of the study. Then, the accounts and production records are analysed to determine the cause and effect of relationships between the use of land, labour, machinery, fertilizers, feed, etc., and yields, labour incomes and net returns.

Each project is continued for a sufficient number of years to eliminate the effect of unusual weather conditions in one season and over a sufficient number of farms to eliminate the effect of a local peculiar circumstances on any individual farm. The averages and the relationships obtained from the analysis, form the basis of the published report on the problem being studied. In addition each co-operating farm operator is supplied with a statement at the end of each season, showing a break-down of his own business operations, compared with a similar break-down of the averages for all co-operators in his area and in the Province.

The interest among Ontario farmers in this program of farm business studies is seen from the numbers that are already co-operating by maintaining cost records:—

Study	*Number of Co-operators*
Corn for canning	171
Peas for canning	181
Tomatoes for canning	175
Commercial late potatoes	70
Hogs	55
Dairy Cattle	150
Dairy Herd Improvement Association Members	775
	1,577

PROGRESS REPORTS ON SPECIFIC STUDIES

Final conclusions from farm business studies cannot be arrived at until the study has been conducted over a sufficient number of seasons to average out the effect of unusual conditions occuring in any one season. Some of the projects, however, have been carried for sufficient time to justify some tentative observations and conclusions.

These projects are reported, herewith, and include:

(a) Canning Crop Production Costs;
(b) Potato Costs per Acre;
(c) Ontario Hog Survey;
(d) Winter Wheat Study;
(e) Pasture Experiment — Middlesex County;
(f) Sheep Costs Study;
(g) Dairy Production Costs;
(h) Farm Title Transfer Study.

Canning Crop Production Costs

A cost of production study has been conducted by the Farm Economics Branch of the Ontario Department of Agriculture in co-operation with the Ontario Vegetable Marketing Board and the Economics Department of the Ontario Agricultural College. The crops studied were — peas, sweet corn and tomatoes grown for canning. This report deals with 1948 costs.

In 1948 there was an unusually good tomato crop. The yield was very good in both quantity and quality. The pea crop was also above long-time average and these favourable circumstances must be kept in mind when interpreting 1948 figures on net returns.

The cost per acre was higher for tomatoes than for peas or corn on every item. Even the more controllable items, like fertilizer, were considerably higher because tomatoes respond better to fertilizer and give a higher gross return to justify the extra effort and expense.

The amount of cost accounted for by labour, power and machines ranged from 54 per cent for peas to 74 per cent for tomatoes. The per cent for materials used was high for peas, because of the high seed cost and relatively low other expenses. The man hours of work is quite high on tomatoes, particularly at harvest or "picking" time. Harvesting took the most labour on all crops, requiring over half the total time on peas and tomato crops.

The method of calculating costs used, charges all labour at prevailing rates for hired help. It does not assess management or risk. Therefore, the "net returns" are returns for management and risk. The average returns for management and risk were quite good on tomatoes; fairly good on peas and low for corn on the 1948 crops.

The variation by farms is even greater than the variation by years. While the returns to management per farm from peas averaged about $188, one operator cleared just over $1,500, and another lost $279. Similarly the corn and tomato growers had returns for management ranging from good returns to substantial losses. Such variation is very important to the individual grower and the records were analysed to determine where it came from. The only safe way to determine this was by grouping the farm records on one cause of high or low net returns, at a time, in groups large enough to let other factors cancel out, and thus get the true effect of one cause. Thus, all enterprise records were grouped first on yield produced per acre.

Costs rose with yields but returns rose faster and net returns increased with yields. Low yields of peas or corn resulted in a loss on the crop. In peas this average loss occurred in all groups until 1,500 pounds per acre were harvested. Corn crop losses continued until a yield of about 4,000 pounds per acre was reached. Tomato yields did not vary as much as peas or corn yields chiefly because of the practice of replanting. This adds to cost but gives a second or third chance of getting a crop. There were no groups of tomato growers that took an average loss due to yield alone in 1948. Yield is an important cause of variation in net returns but it does not account for nearly all of the variation which occurs.

Net returns went down with each increase of pre-harvest labour required to handle the crop. The only exception to this rule occurred in the group of tomato growers with low yields and using less than 30 hours of time before harvest. The implication seems to be that this group suffered lower yields in part by reason of insufficient attention. Time saved, of course is only a saving if it permits an equally good job. The saving in time came from many sources. One, was the size of the enterprise which is discussed later. Time on peas per acre was closely tied up with the acres contracted This would be because larger acreages permit the use of larger or more efficient machines and methods of doing the job. Another cause of difference in time required was the way the work routine was organized. All farms are different in this respect. Perhaps the most important difference in pre-harvest labour comes from the number of times a field is "gone over." Each time requires preparation and travel in addition to the actual time in the field. For example, it was found that net returns went down steadily with each increase in the number of "times over" before planting beyond four, including plowing. Those who did not plow before planting peas got very poor yields and net returns. The best-off group were those who put machines over the field just four times. The next best-off group were those who went over the field less than four times! A possible explanation for the large number of times over by some operators is that they may be trying to get that fine loose mulch which is associated in their minds with high humus content and high fertility. While a well-worked soil may look the same as a soil with high humus, it is not the same.

Net earnings normally increase with the number of acres contracted. One reason is that average costs per acre declined steadily with an increase of acres. This is because of the better machinery and methods possible with larger acreage. However, larger acreage can mean larger losses if the other conditions are unfavourable. For example, canning corn enterprises with low yields had larger losses with larger number of acres. If yields and prices are fabourable then acres contracted were the most important single factor boosting net earnings.

The effect of fertilizer in 1948 was unusual because of a very dry period in the early part of the summer. Peas which are harvested very early showed practically no response to fertilizer. Corn yields per acre responded to commercial fertilizer but not enough to offset the increased cost. The group of corn growers who used no manure and no fertilizer were mostly from Prince Edward County where an unusually good crop was obtained in 1948. Therefore, no conclusion can be drawn from this group. The highest net returns were obtained by the group of tomato growers using the most commercial fertilizer; namely, over 700 pounds per acre.

The 18 pea growers who could get a yield of 2,200 pounds per acre with six hours or less of labour and had seven acres or more contracted, on the average, had a net return for management of $728, from the crop. However, an equal number fell below these targets on all three counts and took an average loss of $46. The majority of growers are high in one or two of these factors and low

in the others. The only sweet corn growers who were able to clear anything for management were those above average in crop yield and acreage contracted and below acreage in labour time.

The growers of tomatoes with top income had over six acres contracted, obtained yields of 21,000 pounds per acre or more with 43 hours or less of pre-harvest labour and used over 600 pounds of commercial fertilizer. About one-half of the growers were above average on any one of these standards but few were able to be above average on all of them. There seems to be no necessary relation between a grower's ability to master one of these requirements and his ability to handle any other!

Potato Costs per Acre

(1949 Preliminary Report for Central and Western Ontario)

Costs of producing potatoes have been analyzed up to marketing time for twenty farms in Central Ontario and fifty farms in Western Ontario.* Marketing Costs will be calculated later.

TABLE 1—COSTS PER ACRE BY SOURCES

	Average of 70 Farms	
Cost Items	*Value*	*% Total*
Man Labour	$ 39.09	27
Machinery	11.51	8
Tractor Time	10.01	7
Horse Time	7.79	5
Misc. (meals, custom work, mileage, etc.)	4.86	3
Materials	67.47	47
Overhead	3.89	3
Total	$144.62	100

* Central Ontario Counties were — Durham, Ontario and York.
Western Ontario Counties were — Dufferin, Peel, Simcoe North and Simcoe South, Waterloo and Wellington.

Labour represented over one-quarter of the total cost. Materials such as seed, fertilizer and spray were still more important and equalled nearly half of the total cost. The overhead costs were three per cent of the total. While this is small on a percentage basis, it is still an item of about four dollars per acre.

Hours — About one-half of the labour is spent on the harvesting of potatoes. Apparently Central and Western Ontario do not differ much in the use of labour. The tractor was used more in preparing the ground than in any other phase of the work but also played an important part in the harvesting operations. Horses were used mainly in preparing the ground. Horse hours were high in seed-bed preparation because horses were used to a large extent in drawing out the manure.

Materials — Sixteen bags of seed potatoes were planted to the acre on the average in Central Ontario and fourteen bags in Western Ontario. Growers in Central Ontario applied an average of 10 loads of manure to an acre, and nine loads were applied in Western Ontario. Central Ontario growers applied an average of 1,366 pounds of fertilizer per acre and Western Ontario 1,027 pounds per acre. The two areas averaged 1,103 pounds per acre.

Labour, power and machinery costs are high in harvesting and in seed-bed preparation. This is because of the high man hours used in harvesting and the high tractor and horse hours used in preparing the seed-bed.

The big costs in the materials section are seed potato costs and commercial fertilizer costs. The cost of spray and dust is not quite half of the cost of seed. Central Ontario costs per acre were a little higher than those of Western Ontario. Seed, commercial fertilizer, spray, and dust values for Central Ontario are higher than for Western Ontario and harvesting costs were also higher. The thirty dollar difference in total costs between the two areas is due to the fact that Central Ontario growers produced potatoes more intensively, probably due to their location near the large metropolitan area around Toronto. The cost of production per acre averaged one hundred and forty-four dollars and sixty-two cents ($144.62) per acre.

The cost of production decreased over $25.00 per acre when 12 or more acres of potatoes were grown. The man hours per acre required decreased because of the replacement of horse time by tractor time. The horse hours per acre go down and the tractor hours per acre go up as the size of enterprise increased.

Ontario Hog Survey

A study was continued of the requirements of hog production in commercial herds of Ontario. The Farm Economics Branch co-operated by doing the analysis to determine the relationships between practices and results. The herds on which records were kept had not less than three brood sows with both breeding herd and market herd operations complete on each farm.

The period from July 1st, 1948, to June 30, 1949, was a period when feed prices were low compared to pork. The average return for management and risk was $1,093 over costs, including pay for time at prevailing hired man rates of pay (Table 2) The effect of the changed price relationships will be studied in the next year's analysis.

Table 2 — Financial Summary

	Average 55 Herds Total Cost	
	$	%
Feed Cost	2185	81
Labour Cost	283	11
Current Expenses	28	1
Capital Charges	190	7
Total Cost	2686	100
Gross Returns	3779	
Net Gain	1093	

While these farms were similar in many respects, their practices in choice of feeds and in feeding, housing and care, varied greatly and also the net earnings obtained. The net earnings on hogs varied all the way from a gain of over $2,500 on one farm to a loss of about $100 less than hired man's pay on another.

There was no one practice or choice of feeds alone which could account for nearly all of this difference in net earnings although several did have considerable effect on net earnings.

The pigs weaned per brood sow are determined by the number of pigs born per litter and the health of the sow and the little pigs. These in turn seem to be affected by heredity and the feed and care received by the sow and young pigs. The average number weaned per brood sow per year was fifteen. Fifteen operators weaned less than thirteen pigs per sow. These operators averaged a net gain of $692, on hogs. Fourteen other operators each weaned over 16 pigs per sow. They averaged about twice as much in net earnings.

The feed required to produce 100 lbs. of pork varied all the way from less than 350 pounds to over 480. This variation was associated with the balance between proteins and carbohydrates fed, the health of the hogs and the method of feeding. Twenty operators were able to get a hundred pounds of pork with less than 400 pounds of feed. They had an average of $1,406, left for management and risk. The 16 who required over 475 lbs., feed had only $637, or less than half as much left for management.

Getting Grade A hogs cost less per hundred pounds than producing off grades. The cost was over 50¢ per hundredweight less where over 55% of grade A's were produced than where less than 39% grade A's were produced. The higher percentages of Grade A's took more time and care (32 hours per five hogs compared with 23 hours where fewer grade A's were produced), but this was more than offset by a saving of over 30 pounds of feed per 100 lbs. of live pork.

Hand feeding cost $1.00 less per 100 lbs. live pork than self-feeders. Hand feeding took 45 lbs. less feed per 100 lbs. live pork produced which more than offset the saving of about one hour of chores per 100 lbs. of live pork with the self-feeder. The operators using self feeders, however, operated larger herds and had the highest net earnings by a small margin. High feed prices would increase the advantage of hand feeding while low feed prices would favour self feeders. Self feeding was more consistent in results than hand feeding only. Those who were good at judging quantities to hand feed obtained better results than with a self feeder.

Commercial Mixed Feeds increased the cost per 100 lbs., of live pork slightly. This was due to taking slightly more feed per 100 lbs., gain. However, those using over 60% of pre-mixed commercial ration were able to handle one-third larger herds and had the highest net returns.

Herds fed skim milk or buttermilk took 58 lbs., less grain per 100 lbs., of live pork than where no milk by-products were fed. The cost per 100 pounds of gain was $1.50 lower where milk was available than where it wasn't. However, the operators who did not depend on milk were operating larger herds and their net returns were just as high as where milk was available.

When the herds were grouped by the number of brood sows kept, the net earnings advanced steadily with the number of brood sows. The net earnings averaged a little over $200 per brood sow kept in the year studied.

The labour used to produce 1,000 lbs., of pork varied all the way from less than six hours up to 72 hours on different farms. This difference was largely due to convenience of arrangements for feeding, watering and cleaning the pens. Some have water piped in, others carry it across the yard in pails, some have feed stored nearby, others have to carry it considerable distances. Cleaning time depends not only on convenience but also on "number of times over". The oftener cleaning was done the better the results but some were able to clean much quicker than others, by reason of better arrangements of pens. The extra care and cleaning was particularly important in handling brood sows and young litters. The low third on time required had average net returns nearly double the third who used the most time on chores.

Balanced feeding, regular breeding, low labour time and a good sized enterprise are each important to success in profitable hog production but it is the number of these in which an operator excels that largely determines the net earnings he can earn. The group that were above average in all these points had net earnings of over seven times that of the operators who were below average in each of these achievements (Table 3). However, it is worth noting that very few were above or below average in everything. The great majority had some strong

and some weak practices. It is by correcting the weak practices that improvement of the net earnings may come.

Table 3 — Effect of Balance in Good Feeding, Breeding, Labour, Use and Size of Enterprise on Earnings and Cost

No. of Factors Above (average or better)	No. of Farms	Net Earnings (average)	Cost per 100 lbs. pork added
0	5	$ 295.40	$18.86
1	11	749.45	15.26
2	20	998.60	15.58
3	13	1273.38	15.47
4	6	2313.83	14.34

Factor Averages were as follows:-

Feeding Efficiency—Feed per 100 lbs. pork produced—390 lbs. or less
Breeding Efficiency—pigs weaned per brood sow— 15 or more
Labour Efficiency—chore hours per animal unit— 28 or less
Size—number of brood sows 5.4 or more
Animal Units=2 brood sows kept one year or 1000 lbs. pork produced.

Winter Wheat Study

The Halton County Crop Improvement Association wished to learn more about their soil and practices in producing winter wheat and their relationship to yields. A competition was sponsored in which each participant had his soil checked for type and analyzed for content. Then each supplied a record of all the operations involved in growing the crop. This information was then turned over to the Farm Economics Branch for analysis.

The variety "Cornell 595" yielded nearly seven bushels more per acre than "Dawson's Gold Chaff," the only other variety used. Those who used at least 200 lbs., of fertilizer had three bushels per acre more than those who used less than 200 lbs. Those who added manure to fertilizer also obtained three bushels increase. Seeding before September 15th gave over two bushels per acre more than seeding after that date. Cultivating the land four times or more gave average yields of about four bushels above those who cultivated less than four times in preparing the land. The longer the time between plowing and seeding the wheat the better was the yield. The three most important correct practices when combined gave a marked increase in yields (Table 4).

Table 4 — Dawson's Golden Chaff — Halton County

Number of Management Practices Correct	No. of Farms	Yield per Acre
1	7	32.51
2	10	36.68
3	15	39.12

Correct practices were assumed to be:

(1) 200 lb. fertilizer or more per acre:

(2) 30 days or more time between plowing and seeding the crop.

(3) With four times or more over with tillage machines between plowing and planting.

Pasture Experiment — Middlesex County

The outline of the experiment was set up and recording conducted by the Departments of Animal Husbandry and Soils of the Ontario Agricultural College, and the analysis carried further by the Farm Economics Branch in co-operation with the above.

The first year of study was 1933 and data down to 1944 was included in the analysis. 100 acres of grass land was divided into two lots of 50 acres each, as nearly equal in original carrying capacity as possible. One-half of the area had fertilizer added as follows:

1933 — 375 lbs. of 4-12-6
1938 — 200 lbs. of superphosphate 20%
1939 — 250 lbs. of 4-12-6

The other half had no fertilizer applied but was left as a check plot.

The fertilized area showed greater carrying capacity and had an annual average of 2,838 steer days of grazing compared with 1,618 for the unfertilized area. This would be 57 steer days per acre compared with 32 steer days on unfertilized ground. The growth was such on the fertilized area that in one year a permit was given to cut a few tons of hay in addition to pasturing.

At 1950 prices the total fertilizer would have cost $15.65 per acre plus $1 for each application. This totals $1.55 per acre per year for an extra 25 steer days of grazing. The rate of daily gain per steer was 2.07 lbs. on the fertilized and 2.26 lbs. on the unfertilized, or the gains were nearly identical with over two pounds of gain per day. The cost of fertilizer would have been well repaid at any price of beef over 4¢ per pound.

Sheep Costs Study

A co-operator has been secured who has purchased 200 ewes and will operate a sheep farm on rough land. He has undertaken to keep all records necessary to get an analysis of the costs and returns in producing lambs and wool. This is intended primarily as a check on possibilities of this development on the rougher lands of Ontario.

Dairy Production Costs

Two important projects with dairy cattle were commenced during the year and the first records will be available in 1950.

One regulation in connection with the Ontario Dairy Herd Improvement Association program is that each operator will keep costs records on his dairy herd. Over 700 such records will be available for analysis.

One hundred and fifty dairy farmers in Western Ontario fluid and manufacturing milk areas are maintaining complete records of their farm operations and cost records on their dairy cattle enterprise. These complete records will supply valuable information respecting Ontario dairy production for analysis next year.

Farm Title Transfer Survey

Considerable concern has been expressed about the problem of keeping good farm boys on the farm and getting them started under favourable circumstances. In order to appraise this problem properly it is necessary to know what the processes are, by which the right to use land passes from a retiring man to a young operator and who the old and new operators are.

Census reports indicate that there has not been much change in the total land farmed in Ontario since 1890. The average size of farm is up from 73.8 to 125.6 acres by 1941 and the number of farms is down. The percentage of farms rented has been rising since 1921 but was still only 15% of the total area in farms in 1941, therefore, the major way of acquiring the right to use land in Ontario is by purchase.

Studies are being made at the Registry Offices in Ontario at selected points in the different types of farming areas. The title changes are examined on a large number of farms and the changes of title are being checked with local people who remember the families and what became of them. This has only been completed for one area yet but some general patterns seem to be emerging clearly.

In the mixed farming areas of Ontario the great majority of the farmers were local boys. There was a close association between a soils productivity and who owned it. The farms were classed into four classes on a basis of productivity indicated by the soils, cultivated acreage and evidence of stock carrying capacity. The farms in the highest productivity class are nearly all owned by locally raised farmers. In many cases these are owned by people raised on them. The farms in the lowest productivity group were seldom held by anyone raised locally, unless it was attached to another and better farm. There were too many boys raised on these farms to have all found farms locally. Hence the movement to the cities. Some large families did all find farms locally but only because other families moved away. The majority of farms were mortgaged at time of purchase. This was true of transfers from father to son as well as sales to outsiders. A more complete picture of the problems involved should be available later.

MISCELLANEOUS BRANCH ACTIVITIES

A — Consultation Services

During the year a considerable number of farm organizations and other groups used the services of the Branch in a consultant capacity in connection with their farm business problems. A partial list of these will indicate the variety and importance of the problems considered:

Ontario Federation of Agriculture re proposed program of cost of production studies and the use of economic data in developing their farm program.

Ontario Crop Improvement Associations and, particularly, the Potato Committee, the Eastern Section and Several County Associations re potato production costs, winter wheat production costs and work simplification.

Ontario Hog Producers Association re hog production costs.

Ontario Vegetable Growers' Marketing Board re canning crop production costs.

Niagara Peninsula Fruit Growers' Association re proposed study of fruit production costs.

Ontario Milk Producers' League.

Ontario Cream Producers' Marketing Board.

Ontario Concentrated Milk Producers' Association re milk production costs.

Ontario Junior Farmers' Associations re capital needed to start farming and a farm business club project.

Appraisal Institute of Canada (Toronto Chapter) re study program and farm land appraisal problems.

United Co-operatives of Canada re survey of relationships between local co-operatives and the central.

National Farm Engineering Committee—Eastern Section—re farm work simplification.

Veteran's Land Act Supervisors re trends in farm prices.

Canning Companies' Field Supervisors re canning crop costs.

Provincial Directors of Cost Studies re uniform methods of obtaining cost information.

B — Short Courses

Fourteen Short Course lectures were given during the year to various groups including — County Short Courses, O.A.C. Short Courses and Courses for Herd Improvement Supervisors, Canning Crop Fieldmen, Appraisal Institute, etc.

C — Public Addresses

During the year farm business problems were discussed in addresses delivered at thirty meetings of various organizations, including: Hog Producers' Associations; Crop Improvement Associations; Fruit and Vegetable Associations; Junior Farmers Associations; Dairy Herd Improvement Associations and miscellaneous organizations such as — co-operatives, church groups and radio audiences.

FRUIT BRANCH

This Branch has the administration of regulations passed under The Plant Diseases Act, The Co-operative Marketing Loan Act, and The Farm Products Grades and Sales Act. As a member of the Farm Products Marketing Board, the Director of this Branch also attends numerous meetings dealing with the administration of The Farm Products Marketing Act. This Branch also provides an extension service in promoting approved methods of culture, packing and marketing of fruit and vegetables. Six fieldmen are on the staff, one in Eastern Ontario, two in the Holland Marsh district, one each in the Kent and Essex district, in the Georgian Bay district and in the Lambton, Middlesex, Waterloo area. These fieldmen, of course, are assigned certain other administrative and regulatory duties, also other departmental duties throughout the year. During the year persons have been appointed to the Fruit Branch for various duties as follows:

R. Belisle, Inspector; R. A Craig, B.S.A., Supervising Inspector; Frank Dobson, Inspector; H. G. Henderson, B.S.A., Fieldman; L. G. Howe, B.S.A., Supervising Inspector; K. W. Hunter, B.S.A., Fieldman; J. A. Inrig, Inspector; John Janzen, B.S.A., Fieldman; W. E. Smith, Inspector; D. E. Williams, B.S.A., Fieldman.

GENERAL

Throughout the fruit growing areas of the Province there has not been any serious evidence of winter injury. During the blooming period weather was favourable for a satisfactory set of fruit. In general heavy crops of fruit, with the exception of grapes, were harvested. In the central portion of the Province dry weather seriously reduced the yields of strawberries and raspberries. Vegetable growers suffered from the long dry period April to August, save in the Leamington district where precipitation was above normal. A very open fall season enabled vegetable growers to harvest crops with much less damage from frost than usual. Prices received for fruit and vegetables showed a decline from the previous year despite the increased costs of production.

Production Commercial Fruits

The final estimated production of fruits in 1949 showed substantial increases above the five-year average, 1944-48 inclusive, except in the case of grapes, raspberries and strawberries, as will be noted from the following table.

TOTAL COMMERCIAL PRODUCTION — FRUIT

Commodity	*Unit*	*5 yr. Average 1944—1948*	*1949 Production*	*1949 % Change from 5 yr. av.*
Apples	Bus.	2,062,224	3,415,542	+ 65.6
Cherries Sour	Bus.	108,449	222,022	+104.7
Cherries Sweet	Bus.	42,371	48,230	+ 13.8
Grapes	Ton	31,166	24,485	— 21.4
Peaches	Bus.	1,102,792	1,237,960	+ 12.3
Pears	Bus.	259,954	504,075	+ 94.0
Plums & Prunes	Bus.	207,227	352,825	+ 70.3
Raspberries	Qts.	3,814,630	3,413,100	— 10.5
Strawberries	Qts.	7,401,914	5,349,900	— 27.7

Vegetable Crop

Not only was the acreage of commercial vegetables down in 1949, with the exception of celery and onions, but yields per acre were also down, save in the case of celery, which showed an increased yield per acre. Despite the falling

off in production the farm selling value was down for all vegetables except beets and head lettuce. Growers' costs of producing, packing and marketing vegetables, however, still continued to rise. The following table summarizes these changes for the more important vegetable crops.

COMMERCIAL VEGETABLE ACREAGE & PRODUCTION

Commodity	*Unit*	*PRODUCTION* *1948*	*1949*	*% Change in 1949*	*Total Farm Selling Value* *1948*	*1949*	*% Change 1949*
Beets	ton	16,123	14,553	— 9.7	434,000	472,600	+ 8.9
Cabbage	ton	41,121	31,949	—22.3	1,297,300	1,015,500	—21.7
Carrots	ton	36,901	28,364	—23.1	1,137,200	950,000	—16.5
Cauliflower	doz.	605,915	495,525	—18.2	938,200	777,100	—17.2
Celery	crate	665,580	901,765	+35.4	1,477,000	1,159,600	—21.5
Lettuce (Head)	doz.	1,817,650	1,719,200	— 5.4	677,900	728,500	+ 7.5
Onions	ton	55,964	48,827	—12.8	3,114,400	2,808,400	— 9.8
Potatoes	ton	485,570	394,833	—18.7	16,213,400	11,503,600	—29.0
Tomatoes	bus.	13,052,944	6,890,495	—47.2	12,371,500	6,232,000	—49.6

Acreage Survey

A further increase in the acreage devoted to vegetables in the Holland Marsh area was again recorded following the acreage survey undertaken. The acreage for 1948 and 1949 may be summarized as follows:

CROP SURVEY FOR THE HOLLAND MARSH

Commodity	*1948 Acreage*	*1949 Acreage*	*1949 % of Total*	*% Change From 1948 Acreage*
Onions	1,550	1,622	28.3	+ 4.6
Lettuce	1,195	1,209	21.1	+ 1.2
Potatoes	1,084	1,130	19.8	+ 4.2
Carrots	872	752	13.2	—13.7
Celery	436	638	11.1	+46.3
Beets	111	79	1.4	—28.8
Cabbage	55	69	1.2	+25.5
Misc. Crops	137	223	3.9	+63.0
	5,440	5,722	100.0	+ 5.2

The growers need improved facilities for cold storing, central grading, packing and marketing local grown vegetables. The Bradford Co-operative Storage Limited has recently commenced the construction of a building which will more than double their cold storage space and provide facilities for central grading. More distant markets may then be supplied and the storage life of the vegetables lengthened. The loss from wastage of vegetables improperly stored and the lower sales value of vegetables improperly packed and merchandized annually costs the industry much.

Survey of Apple Orchards

A survey of the commercial apple orchards was made to ascertain in each county the number of apple trees of each variety in the various age groups. This information was deemed necessary to forecast more accurately the apple crop by districts. Furthermore, the survey revealed a growing demand for some of the newer varieties of apples and a falling off of varieties formerly grown more extensively. Eight years ago a somewhat similar survey was made. For comparison a percentage of total trees of certain varieties is shown for both surveys. Only the commercial orchards, that is those comprising at least one hundred trees, are included in the following table.

SURVEY OF APPLE TREES BY VARIETY AND AGE GROUPING

Variety	1-7 Years	8-15 Years	16-30 Years	31 & Up	% of Total Trees Survey 1941	Survey 1949
Duchess	1,276	4,084	7,573	3,707	2.72	1.97
McIntosh	63,320	99,109	87,761	24,142	25.73	32.46
Greening	5,766	11,400	9,208	6,709	3.88	3.92
Snow	1,769	7,786	14,881	9,823	4.85	4.05
Cortland	9,266	8,333	3,827	28	......	2.54
Baldwin	510	2,467	4,922	12,867	4.43	2.46
Delicious	10,715	32,533	20,505	562	6.99	7.61
Stark	272	482	3,625	12,010	4.31	1.94
Spy	32,982	55,378	52,255	54,154	23.69	23.05
Ben Davis and Gano	8	1,847	2,417	4,606	2.32	1.05

Fruit Merchandising Tests

In co-operation with the staff at the Horticultural Experiment Station certain new packages for fruit were shipped experimentally to nearby and to distant markets. The Vineland staff supervised the packing and shipment of these packages and members of this Branch obtained comments from retailers and consumers. A more detailed summary of these tests may be obtained by referring to the Horticultural Experiment Station report. Investigations were also made to ascertain consumer preferences on the quality and pack of Ontario potatoes, tomatoes, celery and honey.

Fieldmen

After getting their discharge from the armed forces and having completed a course of study in agriculture, several inspectors were appointed as fieldmen to undertake extension work among fruit and vegetable growers. This is in the interests of our inspectors giving them a wider interest in agricultural matters and tending to stress the importance of helping growers, not simply checking up on them. Duties as extension specialists and as inspectors work together very nicely. The grower looks favourably upon the inspector who can give helpful assistance in cultural methods, in controlling insects and diseases and in the better packing and marketing of his products. At a season of the year when inspection work has fallen off our fieldmen have been holding meetings and study groups and making soil tests for the growers. A still greater service will be rendered as our fieldmen become better known, more experienced and better equipped.

THE PLANT DISEASES ACT

Apple Maggot

Though a somewhat larger number of growers had their orchards designated as "plant disease control areas" in 1949, as provided under The Plant Diseases Act, still the number represents only a small number of the commercial apple growers of the Province. Fieldmen and inspectors appointed by this Branch visited the orchards to ensure that all hawthorns had been destroyed on the premises of the applicant and for a distance of 300 yards surrounding the orchard lands.

The Division of Plant Protection organized and supervised a survey of all the orchards approved by the Province. In this survey the Dominion Fruit and Vegetable Division, together with fieldmen of this Branch, assisted. Report forms were completed that the necessary certificates might be issued under The Destructive Insect and Pest Act where apples were destined for export to United Kingdom markets.

Considerable improvement has been noted in the destruction of hawthorns growing in pasture fields, along fence rows and roadsides. In many cases neglected apple trees in pasture fields and around farm buildings have been removed. This Branch will continue to give assistance to apple growers in an effort to bring about further destruction of hawthorns and neglected apple trees, in order that the commercial apple growers may, whenever market conditions permit, again export substantial quantities of apples to Great Britain.

The following summary by counties indicates that the infestation was lower in 1949, being 20%, compared with 59.55% for the year previous.

APPLE MAGGOT SURVEY ONTARIO COUNTIES

1949

County	*No. Orchard Owners*	*No. Orchards Inspected*	*No. Orchards Infested*	*% Orchards Infested*
Brant	2	2	1	50.00
Dundas	2	2	–	——.
Durham	23	54	7	12.96
Elgin	3	10	8	80.00
Essex	2	5	–	——.
Grey	20	24	6	25.00
Halton	4	8	1	12.50
Hastings	3	4	1	25.00
Huron	1	1	–	——.
Kent	1	3	–	——.
Lambton	5	7	1	14.28
Lennox	1	2	–	——.
Middlesex	27	39	10	25.64
Norfolk	26	39	11	28.20
Northumberland	17	42	5	11.90
Ontario	2	3	1	33.33
Oxford	24	27	2	7.40
Peel	1	1	–	——.
Prince Edward	12	25	2	8.00
Simcoe	8	10	5	50.00
York	1	12	3	25.00
	185	320	64	

20% of Orchard Blocks Infested.

Bacterial Ring Rot in Potatoes

Surveys to determine the occurrence of bacterial ring rot in potatoes was undertaken by Crops, Seeds and Weeds Branch. The degree of infestation has been summarized as follows:

	Infested Farms	*Infested Acreage*
1946	673	3,640
1947	351	1,900
1948	246	1,200
1949	590	2,850

Potato growers have been advised to plant only certified seed stock, to use only new bags or such bags as have been disinfected, to follow an approved system of crop rotation and to exercise care that implements used in production and that warehouses occupied for storage and handling are thoroughly disinfected. Unfortunately it has been necessary to prosecute fifteen persons who were fined for failure to comply with the regulations.

Dutch Elm Disease

The elm stands pre-eminent among trees scattered throughout rural Ontario. A tree that like a fountain rises, its grace of outline, its grandeur of size, will be sadly missed from our countryside if its arch enemy — the Dutch Elm Disease — is not curbed. The elm will go the way of the sweet chestnut. It has been the experience of European countries and of certain areas in the United States and Canada that death of our elms is inevitable where the disease is not promptly controlled or eradicated.

Again in 1949 this Branch co-operated with the Dominion Division of Plant Protection in carrying out a survey of the ten eastern counties of the Province, Prescott, Glengarry, Russell, Stormont, Carleton, Dundas, Grenville, Leeds, Lanark and Renfrew. Ten Ontario men and five Dominion men comprised five crews of three men each. A short course of training was held at Berthierville, Quebec, where all scouts were given an opportunity of seeing trees infected with Dutch Elm Disease and were given group instructions respecting collecting samples, climbing trees, pruning, etc. The survey got under way June 15 and was completed for the season on September 15th.

The total number of samples submitted from Ontario was 363 and it is most gratifying to be able to report that no evidence of the disease was found anywhere throughout Ontario during 1949.

The total disbursements by the Province covering salaries and expenses of those undertaking the scouting survey totalled $6,381.56.

To discover this dreaded disease as soon as it occurs in Ontario and then to adopt effective measures for eradicating or controlling the disease is the objective of those supervising the survey. Our elms are priceless.

Japanese Beetle

Established infestations of Japanese Beetle at Hamilton, Niagara Falls and Fort Erie were revealed by the trapping programme carried on co-operatively during the summer of 1948 by this Branch and the Division of Plant Protection. Control measures were deemed advisable. Prior to this year control measures comprised spraying affected areas with arsenate of lead. In 1949 DDT was used instead of arsenate of lead with a marked saving in costs for materials and labour — $67.32 per acre in the case of DDT compared with $171.50 per acre when arsenate of lead was used in 1946.

The acreage treated in the various municipalities during the period May 27 to June 11 was — Hamilton, 19.4; Niagara Falls, 7.0; and Fort Erie, 10.5; total 36.9 acres.

During the year under review eighteen trap attendants made a survey to ascertain any changes in the prevalence of this pest. Vigilance to detect increasing infestation is necessary. Efforts to prevent this pest gaining a foothold likewise are in the interests of the state.

Nursery Inspection

Four undergraduates working under the supervision of the Provincial Entomologist, were appointed to inspect those nurseries registered in Ontario. Infestations of San Jose Scale or evidence of infection by Pear Blight were carefully looked for. In general it may be said that the nursery stock is quite free from these pests, as will be noted from the following summary, even though the degree of infestation was somewhat higher than in 1948.

No. of Nurseries	No. of Plants Inspected		No. of Plants Infested with San Jose Scale Destroyed	No. of Plants Infected with Pear Blight Destroyed
82	2,038,606	fruit trees	1,437	24
79	1,229,285	ornamentals	188	—

Two of the inspectors devoted some time in the nurseries ascertaining whether the varieties of fruit were true to name. A start was also made in determining whether certain fruits being grown in the nursery were free from virus diseases. It is intended to extend this supervision in the years ahead in order that commercial fruit growers may be given the added assurance that any nursery stock bought from inspected nurseries is true to name and free from virus disease.

Sugar Beet Nematode

During the sugar beet harvesting season our inspection staff supervised the unloading of beets grown in the Blackwell or "precautionary area." This supervision was to prevent, as far as feasible, the scattering of nematode infested soil on lands not presently infested. Washing of railroad cars used in transporting sugar beets from the "precautionary area" to the sugar company was also supervised.

Wherever good farming practice has been followed, particularly a three or four year rotation, before sugar beets are grown again on the same lands, has convinced the growers this pest no longer need cause undue concern. Growers have learned to live with the disease. In 1948 on the A. Poppe farm at Jeanettes Creek, Kent County, a new infestation of nematode was found. In 1949 a careful check was made of beets grown on the A. Poppe farm and of beets grown in surrounding area. It was gratifying to learn nematodes were nowhere in evidence this year. Many of the heaviest yields of sugar beets reported in Ontario were grown in the "precautionary area" where the nematode has been known to exist for fifteen years.

Spring flooding by Perch Creek appears to facilitate the spreading of the nematode. Most of the infestation appears to be in the reclaimed lake property mainly along concession eight. Some day perhaps the municipality, the county or Government may individually or jointly prevent the annual flooding of these lands.

THE CO-OPERATIVE MARKETING LOAN ACT

This Act empowers the Government to make loans to Co-operative organizations of producers incorporated under Part XII of The Companies Act, to assist them in establishing facilities for the better marketing of farm products.

During the time this Act has been in force some eighty-five co-operatives have been assisted by these loans and the many large and modern co-operative cold storages in the various producing areas of the Province owe their existence to the fact that these loans were available at low interest rates.

All applications received during the past year were dealt with by this Branch and, after careful consideration and investigation, loans to the following co-operatives were approved:

Name of Co-operative Association	*Facilities*
1. Vineland Growers Co-operative Limited	Fruit, Pre-Cooling
2. Dryden District Co-operative Limited	Dairy and Creamery
3. Co-operative de Hanmer	Potato Storage
4. La Co-operative Agricole de Val Gagne	Feed and Farm Supplies
5. Burgessville Fruit Growers Co-operative	Apple Storage
6. Dufferin Potato Growers Co-operative Ass'n.	Potato Storage
7. La Co-operative Agricole D'Earlton	Feed and Farm Supplies
8. La Co-operative Agricole D'Embrun Limitee	Feed and Farm Supplies
9. St. Albert Co-operative Cheese Mfg. Ass'n.	Cheese Factory
10. Lavigne Co-operative Cheese & Butter Factory Ltd.	Cheese Factory
11. Blyth Farmers' Co-operative Association	Cheese Factory

Representatives of this Branch make periodic visits to all co-operatives where loans have been made and give assistance and advice wherever requested.

Thedford Cold Storage

The storage warehouse owned by Thedford Cold Storage Ltd. was taken over by the Province in 1939 to satisfy a claim under the terms of the mortgage and was operated by this Branch until January 31, 1950. All claims of the Government against this company having been settled in full, the vegetable growers of the Thedford area formed a co-operative, Thedford Co-operative Storage Limited, which took over the storage and have been operating it since February 1, 1950.

THE FARM PRODUCTS GRADES AND SALES ACT

Licensing Dealers

During the year 1949, a total of 1,125 fruit and vegetable dealers were licensed by this Branch and markers issued for 2,157 trucks operated by licensed dealers for transporting fruit and vegetables in Ontario. Most dealers are co-operating with the Department in carrying out the licensing regulations and during the year there were only two prosecutions for dealing without a licence.

Several complaints arising out of unsettled accounts were investigated and satisfactory settlements arranged between the dealer and the grower in all but two cases where it was found necessary to cancel the dealer's licence.

Tomato Grading

In Eastern Ontario and in eleven counties comprising Central Ontario tomatoes purchased for processing were graded by government graders. This was obligatory in the areas mentioned, grading being done at 58 processing plants and receiving stations. Plans are presently under way to extend the service next year to embrace the entire Province, provided suitable graders can be procured. There have been some objections filed by growers and by processors but when regulations apply throughout the Province and the parties concerned adjust their methods of operating accordingly, opposition, it is expected, will cease. Fundamentally, the sale of agricultural products on a grade basis is sound and fair to buyer and to seller.

Highway Inspection

Highway inspection stations at important shipping points serve well to ensure that fruit and vegetables meet the grade requirements before moving forward to market. Inspectors also visit packing plants of growers and dealers in the area. Several of these inspectors, because of experience, tact and understanding, are frequently consulted. Inspectors capable of carrying on extension work are most valuable to the Branch and to the industry.

Highway inspection stations are so located that all fruit and vegetables moving by motor vehicle from the important producing areas of Kent and Essex Counties, the Niagara Peninsula and the Holland Marsh area may without undue inconvenience stop briefly for an inspector's clearance. These areas produce a sufficient volume of certain products and of a dependable grade so that the market price for the Province is largely based on the price ruling in these areas.

Station	*No. Trucks Checked*	*No. Detentions*	*No. Packages Produce Carried*
Bradford	8,645	314	1,592,648
Fruitland	7,596	115	3,439,983
Gravenhurst	4,736	68	1,069,199
Wheatley	4,143	182	2,704,438

Administrative Inspection

In the more important distributive centres and in some of the large consumer centres inspectors regularly check fruit and vegetables for grade and proper markings. Periodically the premises of wholesalers and retailers are visited and the produce examined. This administrative inspection work, though it fails to rank in importance with packing house or shipping point inspection, where produce is inspected before it moves forward to market, nevertheless tends to ensure consumer satisfaction. In certain far away markets where competition is not as keen as in markets near the shipping point, the need for periodic inspection is pronounced.

In the City of Toronto during the year the following records will indicate the scope of work carried on by our administrative inspectors.

Visits to wholesale warehouses	5,045
Visits to retail stores	2,276
Number of packages inspected	1,093,634
Number of packages actually examined	41,900
Number of detentions	520

Similar work is carried on in other consuming centres. During the year our staff was increased and during the coming year the work will probably be further extended.

LIVE STOCK BRANCH

INTRODUCTION

During the year 1949 Ontario farmers derived a cash income from the sale of farm products amounting to $653,512,000. This represents a reduction of about $10,000,000 from the all time record year of 1948. In both years the live stock industry accounted for approximately 73% of the total cash income, but the relative position of the various products within that industry was altered somewhat. Hogs which ranked second in 1948 forged into the lead last year, with sales totalling $150,649,000. Beef cattle and calves moved up from third to second position, with a value of $133,076,000. Dairy products, the leader on many previous occasions, dropped to third place, with sales valued at $127,905,000. Poultry and egg sales declined by almost $17,000,000 to $62,335,000. Sheep, lambs and wool sales totalling $4,951,000 showed a slight increase over 1948.

Hogs and cattle sold at or near record prices throughout most of the year. The price increases accounted in no small measure for the higher total returns. Milk production registered a decline, largely because of the dry season and unfavourable pasture conditions throughout the summer months. The price of some dairy products, principally butter, was lower than in the previous year. These two factors combined to bring about lower returns to the men engaged in dairying.

Favourable export outlets for surplus production were available throughout the year. All bacon, eggs, and most of the cheese not required in this country were sold to Great Britain under contract. Despite the fact that the 1949 contracts called for lower quantities, only the cheese contract was filled. New contracts for bacon and cheese became effective on January 1st, 1950. In both cases prices are lower than for the previous year, but contract prices are supplemented by Dominion Government subsidies, thereby establishing floor prices above export levels. Late in 1949 Great Britain announced that the egg contract would not be renewed, thus placing Canada in a position of having to find alternate markets for any surplus that might develop throughout the year. The uncertainty about the future which followed this announcement was dispelled when the Dominion Government established a floor price for eggs.

Surplus cattle found a ready market in the United States throughout the year at the highest prices ever experienced up to that time. Beef prices have gone even higher in the early months of 1950, with the result that pork has been placed in a more favourable price relationship. As a consequence a higher percentage of our total cattle has been sold to the United States, and Canadians have increased their consumption of pork. The demand has advanced to the point where most of our supplies are being consumed at home. Wiht a strong domestic market very little product is being made available for export to Britain.

HORSES

The number of horses on Canadian farms on June 1st, 1949, was 1.8 million, which figure represents a slight decrease from the previous year. During the twelve months' period ending September 30th, 13,000 head were exported, and 16,200 were slaughtered under inspection for export.

Reports submitted by owners of premium stallions indicate that horse breeding is still on the decline. Probably not more than 10,000 foals of a type suitable for developing into work horses were born in Ontario in 1949. This is at an average rate of one foal for every twelve farms in the province. If horse breeding continues at that rate, it will take 24 years to produce one team of horses for every Ontario farm.

STALLION ENROLMENT

All stallions used for public service in Ontario must be inspected, approved and enrolled. In 1949 only 542 stallions qualified for enrolment. This marks the lowest number ever enrolled since the Stallion Act was placed on the statutes. Of the total number enrolled 350 were representatives of the heavy draught breeds. Stallions in the two top grades are eligible for premiums, with Form 1 horses qualifying for $3 for every mare left with foal, and Form 2 stallions $2.00 for every infoal mare, providing that in either case five or more mares must be left with foal. In 1949 the owners of 153 Form 1 stallions were paid premiums totalling $11,241, and the owners of 43 Form 2 stallions received premiums amounting to $1,766. All premiums paid by the Ontario Live Stock Branch are duplicated by the Dominon Department of Agriculture.

HORSE SHOWS

The Ontario Live Stock Branch makes grants available to local Horse Breeders' Associations for the purpose of assisting them in sponsoring special horse shows. The grants are on the basis of 50% of the prize money paid out to exhibitors, up to a maximum of $300 per show. If all local associations in a county combine to sponsor a County Show, the maximum grant may be $500, provided a similar contribution is obtained from the county council. One new association, namely the North Blenheim Horse Breeders' Association, was organized during the year.

The following is a summary of grants paid on account of special horse shows during the fiscal year:—

Elgin Horse Breeders' Association Show	$300.00
Wingham Horse Show	300.00
Cannington Agricultural Society Horse Show	168.00
Perth County Horse Breeders' Association Show	500.00
Linwood Spring Horse Show	293.50
Brampton Horsemen's Association Horse Show	300.00
Middlesex Heavy Horse Show	52.40
North Blenheim Horse Breeders' Association Show	300.00
Brantford Horse Show	300.00
St. Catharines Riding & Driving Club Ltd. Show	300.00
Hamilton-Wentworth Horse Show	300.00
Toronto Horse Show Association	300.00
Lambton Kent Horse Breeders' Association Show	500.00
Galt Horse Show Association Show	300.00
Brooklin Spring Fair Association	300.00
(15 shows)	$4,513.90

FEDERAL-PROVINCIAL PURE BRED FOAL POLICY

This policy was instituted in 1949 in an effort to stimulate interest in the breeding of high class heavy horses. Under the terms of the policy, the owner of an approved pure bred mare that produces a living foal sired by a Form 1 stallion is entitled to a premium of $25. One-half of this amount is paid by the Dominion Department of Agriculture and the other half by the Ontario Live Stock Branch. Mares are inspected by the stallion inspectors at the time of the regular stallion inspection, and only those mares that are of good type and free from hereditary unsoundness will qualify for approval. The first premiums under this policy will be paid during the fiscal year 1950-51.

CATTLE

Cattle slaughterings in Canada for the year 1949 were in the neighbourhood of 1,439,489 head, a decline of 3.4% over the previous year. The decline accurred in Western Canada, slaughterings in eastern parts of the Dominion being slightly above 1948. Exports of beef type cattle approximated 321,201 head, a slight increase over the previous year. Shipments of beef and veal to outside countries totalled 101,219,200 lbs. This is equivalent to approximately 200,000 head of cattle. Prices followed the general trend in the United States, and the average price for the year was the highest in this country's history. Dairy cattle exports totalled 64,964, a decline of almost 40,000 head in 1949. Most of these dairy cattle were sold in the United States. Purchases by residents of other countries, paticularly Latin America, fell off sharply, due to currency difficuties.

RESTRICTED AREAS

Tests conducted under the restricted area plan were more numerous than in any previous year. At the end of 1949 all counties in Old Ontario and all Districts in Northern Ontario except Haliburton, Muskoka and Parry Sound had been declared restricted areas.

When the incidence of infection is reduced to less than one-half of one per cent of the cattle population, an area is declared an accredited area for a period of three years. If the incidence of infection is less than one-fifth of one per cent, it receives an accredited area status for a period of six years. At the end of the fiscal year twenty-one counties or districts had been declared accredited areas.

The following is a summary of the status of T.B. testing in those counties where tests were conducted during the fiscal year:—

County	*Test*		*No. Herds*	*Cattle*	*Reactors*	*% Reactors*
Algoma	2nd	General	204	3156	———	———
Brant	4th	"	660	8797	40	.45
Dufferin	2nd	"	1508	31077	122	.39
Durham	3rd	"	1119	19316	34	.18
Elgin	1st	"	2119	33066	3787	11.45
Essex	3rd	"	2450	20155	76	.38
Frontenac	1st	"	1777	32573	540	1.66
Grey	2nd	"	1067	22603	465	2.06
Hastings	2nd	"	703	12218	28	.23
Huron	1st	"	2988	64261	3403	5.30
Kent	1st	"	1797	16751	1003	5.99
Lambton	1st	"	1882	35526	2109	5.94
Leeds	5th	"	1405	29073	10	.03
Lennox & Addington	1st	"	1685	27371	178	.65
Middlesex	1st	"	4401	84396	10245	12.14
Nipissing	1st	"	294	3594	116	3.23
Norfolk	3rd	"	2808	19636	151	.77
Oxford	2nd	"	421	6684	134	2.00
Perth	2nd	"	877	19310	223	1.15
Peterborough	2nd	"	1499	28033	31	.11
Rainy River	3rd	"	337	3836	2	.05
Renfrew	1st	"	2289	49213	1043	2.12
Simcoe	2nd	"	5028	94736	346	.37
Thunder Bay	4th	"	472	4426	3	.07
Victoria	2nd	"	426	10336	82	.79
Waterloo	3rd	"	2431	39931	258	.65
Welland	2nd	"	1697	12567	31	.25
Wellington	2nd	"	2082	42486	209	.49
Wentworth	3rd	"	1611	19364	57	.29
York	4th	"	2902	45290	137	.30

The Ontario Live Stock Branch paid the expenses of Federal Veterinarians while engaged in this work. The total amount so paid was $80,485.59.

WARBLE FLY CONTROL

At the 1949 Session of the Legislature a new "Warble Fly Control Act" was placed on the statutes. Under the provisions of this Act the council for the municipality is obligated to pass a by-law requiring all cattle to be treated for warble fly in accordance with the regulations, if and when two-thirds of the cattle owners sign petitions requesting that such action be taken. The regulations specify that cattle must be treated on at least two occasions; once in month of April, and again in May. During the year, forty-four township councils passed by-laws under this Act. These townships were distributed as follows:—

Bruce County	16	Simcoe County	4
Dufferin County	6	Renfrew County	2
Grey County	7	Perth County	1
Huron County	6	Victoria County	1
Manitoulin	1		

The total number of cattle treated was in the neighbourhood of 240,000. Most of these cattle received two treatments.

Those municipalities that pass by-laws are entitled to financial assistance on the following basis:

(a)—50% of the salary and travelling expenses of inspectors appointed to enforce the by-law.

(b)—50% of the cost of warble fly powder used in treatment.

The total amount paid by the Live Stock Branch on account of work undertaken in 1949 was $14,588.05.

The Ontario Live Stock Branch co-operated with the Entomology Department of the Ontario Agricultural College and the Parasitology Department of the Ontario Veterinary College in conducting surveys of cattle that were sprayed in order to check on the efficiency of this method of treatment. The survey indicated that the treatment is sufficiently effective for all practical purposes, if carried out according to instructions, and the proper spray is used and applied at a pressure of from four to five hundred pounds, and the back of every animal is thoroughly wetted.

ARTIFICIAL INSEMINATION

Under the terms of the Artificial Insemination Act, all units operating in the province must obtain a licence from the Live Stock Commissioner, except those operated by Breeders' Clubs, Breeders' Syndicates and private individuals. Six licensed units operated in Ontario during the fiscal year 1949-50. Each of these units provides service to one or more counties adjacent to the one in which the headquarters is located. All units maintain Holstein bulls and several have extended their facilities in order to provide service for all breeds that are maintained in reasonable numbers within the area being served. Licensed units receive financial assistance in three forms:—

(a)—One-third of the cost of land, buildings and equipment, up to a maximum of $10,000.00.

(b)—One-third of the cost of each bull, up to maximum of $600.00 per bull.

(c)—50c per cow inseminated and presumed to be in calf.

The following table lists the number of cows serviced by each Association during the calendar year 1949, and the amounts paid in grants during the fiscal year 1949-50:—

Name of Centre	*No. of Cows Serviced*	*Total Grants Paid*
Hamilton District Cattle Breeding Association	9,877	$16,880.90
Waterloo Cattle Breeding Association	3,977	10,222.35
Quinte District Cattle Breeding Association	10,421	15,168.22
Eastern Ontario Cattle Breeding Association	15,188	14,725.66
Essex Cattle Breeding Association	2,409	1,361.33
Maple Cattle Breeding Association	20,791	16,564.33
Total	62,663	74,882.79

BULL PREMIUM POLICY

The Ontario Beef Cattle Improvement Association became incorporated under the Agricultural Associations Act during the year 1949. The Directors of this organization consist of three representatives from each of the following Associations or Departments: — the Ontario Shorthorn Association, the Ontario Aberdeen Angus Association, the Ontario Hereford Association, the Ontario Beef Producers' Association, and the Ontario Department of Agriculture. The main function of this Association is to sponsor an annual sale of pure bred beef bulls. All bulls brought forward are subjected to rigid inspection by a committee appointed for the purpose, and only those bulls that are approved are eligible to pass through the sale. Every Ontario resident who purchases a bull is eligible for a premium paid by the Ontario Live Stock Branch, equal to one-third of the purchase price, up to a maximum of $150.00. The first half of the premium is paid immediately following the sale, the second half at the end of twelve months, providing the bull is being maintained in a satisfactory breeding condition. Following is a brief report of the bulls sold in the sale of March 22nd, 1950:—

	48 Herefords,	average price	$550.00	top price	$1000.00
	89 Shorthorns,	" "	$516.74	" "	$1300.00
	35 Aberdeen Angus,	" "	$555.28	" "	$1550.00
Total	172 Bulls	" "	$533.86		

Every bull in the 1950 sale was purchased by a resident of Ontario, and the premiums paid to the purchasers totalled $12,401,01. This figure represents the first half of the premium. Premiums totalling $4,259.16, representing the second half of the premium on bulls purchased in the 1949 sale, were also paid during the fiscal year.

Under the terms of the "Bull Premium Policy" organized clubs consisting of at least three members owning a minimum of thirty cows may qualify for premiums upon purchasing approved bulls at breeders' consignment sales. The premium payable to such clubs is similar to that applying to individuals purchasing bulls at the provincial sale. Two clubs purchased bulls in 1949-50 and received premiums totalling $150. Five clubs purchasing bulls in 1948-49 were paid the second half of the premium, amounting to $278.32.

AUCTION OF PURE BRED LIVE STOCK

The Ontario Live Stock Branch assists breeders' clubs holding consignment sales through the payment of grants, at the rate of $4.00 per animal sold up to a maximum of $150.00 per sale. If a show is held in conjunction with the sale, the sponsoring organization may qualify for an additional grant of $25.00.

The following is a summary of the grants paid to associations during 1949-50:—

Association	No. Head Sold	Amt. of Grant	Prize money Grant
Dufferin Pure Bred Beef & Swine Breeders' Association (Angus, Hereford, Shorthorn)	28	$112.00	
Toronto District Ayrshire Breeders' Club	45	150.00	
Grey-Bruce Aberdeen Angus Club	33	132.00	
Grey County Shorthorn Breeders' Club	33	132.00	$25.00
All-Eastern Ontario Holstein Sale Association	69	150.00	
Grey-Bruce Hereford Breeders' Club	23	92.00	
Bruce County Shorthorn Breeders' Club	31	124.00	
Southern Counties Ayrshire Breeders' Club	11	44.00	
Ayrshire Club of Ontario	65	150.00	
Tri-County Shorthorn Club	40	150.00	
Western Ontario Consignment Sale Company (Shorthorn)	45	150.00	
Lambton-Middlesex-Oxford Shorthorn	42	150.00	
Royal Shorthorn Club	56	150.00	
South Simcoe Beef Breeders' Club (Aberdeen Angus, Hereford, Shorthorn)	30	120.00	
Tri-County Shorthorn Club	42	150.00	
Durham County Shorthorn Association	24	96.00	
Ontario-Aberdeen Angus Association	47	150.00	
Victoria County Shorthorn Association	18	72.00	

SUMMARY OF SALES BY BREEDS

No. of Sales	Breed	No. of Cattle	Total Selling Price	Average Selling Price
11	Shorthorn	369	$113,215.00	$ 306.82
3	Ayrshire	121	29,530.00	244.04
3	Hereford	40	12,745.00	318.62
1	Holstein	69	23,495.00	340.50
4	Aberdeen Angus	84	37,930.00	451.55

SPECIAL CATTLE SHOWS

Local Breeders' Clubs sponsoring special shows may qualify for grants equal to 20% of the prize money paid out, up to a maximum of $100.00 per show. Such shows are designed to serve a definite area, and exhibitors are not eligible to show at more than one special show in any single year. This rule does not exclude winners at local shows from showing at championship shows.

The following is a summary of the exhibits at shows receiving assistance in 1949-50:—

Black and White Shows:

Name of Show	No. of Cattle	No. of Entries	Grant
Stratford (Perth County	198	256	$ 100.00
Ilderton (Middlesex)	127	163	100.00
Forest (Lambton)	68	102	84.42
Aylmer (Elgin)	151	201	100.00
Dresden (Kent)	140	177	100.00
Leamington (Essex)	72	101	100.00
Blyth (Huron)	137	169	100.00
Woodstock (Oxford)	212	257	100.00
Teeswater (Bruce)	100	164	100.00
Simcoe (Norfolk)	105	131	100.00
Caledonia (Haldimand)	78	104	85.70
Ancaster (Wentworth)	65	92	70.22

Black and White Shows: Continued

Name of Show	*No. of Cattle*	*No. of Entries*	*Grant*
Welland (Welland)	99	125	99.80
Waterloo (Waterloo)	152	181	100.00
Brantford (Brant)	77	98	70.60
Milton (Halton)	142	192	100.00
Beamsville (Lincoln)	50	80	56.20
Fergus (Wellington)	122	155	96.40
Brampton (Peel)	98	124	75.40
Lansdowne (Leeds)	94	127	100.00
Spencerville (Grenville)	87	119	86.60
Chesterville (Dundas)	99	133	100.00
Williamstown (Glengarry)	61	81	72.80
Newington (Stormont)	136	179	100.00
Vankleek Hill (Prescott)	75	78	73.60
Kingston (Frontenac)	97	126	100.00
Metcalfe (Carleton-Russell)	161	253	100.00
Renfrew (Renfrew)	92	121	100.00
Almonte (Lanark)	104	146	98.80
Belleville (Hastings)	79	107	66.40
Warkworth (Northumberland)	133	190	100.00
Lakefield (Peterborough)	103	149	100.00
Markham (York)	109	143	83.00
Port Perry (Ontario)	133	175	100.00
Napanee (Lennox & Addington)	106	148	90.20
Picton (Pr. Edward)	96	127	78.20
Beeton (Simcoe)	59	80	85.20
Orono (Durham)	120	165	100.00
Championship Shows:			
London (Western Ontario)	241	282	100.00
Brantford (W. Central Ontario)	180	203	100.00
Peterborough (E. Central Ontario)	182	210	100.00
		TOTAL	$3,773.54

Red and White Shows:

Name of Show	*No. of Cattle*	*No. of Entries*	*Grant*
Ottawa Valley Breeders' Club	80	92	$ 100.00
Stormont Breeders' Club	60	100	64.00
Hamilton-Niagara Dist. Breeders' Club	60	81	81.00
Lambton Breeders' Club	41	47	27.54
Central Ontario Breeders' Club	34	51	41.00
Banner Counties Breeders' Club	62	77	50.20
Toronto District Breeders' Club	101	156	100.00
Leeds-Lanark Breeders' Club	82	112	81.40
Brant County Breeders' Club	33	44	19.00
Glengarry Breeders' Club	53	75	68.00
Grenville-Dundas Breeders' Club	63	90	68.00
Vankleek Hill District Breeders' Club	59	74	57.20
Peterborough-Durham Breeders' Club	32	43	43.00
Simcoe District Breeders' Club	68	101	61.00
Southern Counties Breeders' Club	105	128	100.00
Western Ontario Championship Ayrshire Show	107	124	100.00
Eastern Ontario Championship Ayrshire Show	120	134	100.00
		TOTAL	$1,161.34

Jersey Shows:

Name of Show *Counties*	*No. of Cattle*	*No. of Entries*	*Grant*
Lambton County Jersey Br. Ass'n.	63	78	51.84
Middlesex Parish Jersey Show	72	77	69.20
Ontario & Durham Counties Jersey Cattle Club	82	111	58.80
Peel County Jersey Club	65	75	64.00
Perth-Huron Jersey Club	40	50	33.80
Peterborough District Jersey Breeders' Association	36	44	38.80
Waterloo Jersey Breeders' Association Inc.	50	61	47.40
Wentworth & District Jersey Cattle Club	52	64	50.82
Elgin County Jersey Cattle Club	34	33	51.80
York County Jersey Club	97	129	68.51
Brant County Jersey Cattle Show	41	50	23.20
Kingston District Jersey Cattle Club	83	106	80.00
Halton County Jersey Cattle Show	64	87	43.20
Essex-Kent Jersey Cattle Show	82	88	100.00
Oxford Jersey Parish Show	82	161	100.00
Bruce-Grey Jersey Parish Show	55	71	56.80
Eastern Ontario Jersey Breeders' Association	89	127	100.00
Simcoe County Jersey Club Parish Show	35	44	28.60
Ottawa Valley Jersey Club Parish Show	170	221	100.00
Western Ontario Championship Jersey Show	156	199	100.00
Eastern Ontario Championship Jersey Show	166	257	100.00
		TOTAL	$1,366.97

Hereford Shows:

Renfrew	48	72	78.00
Barrie	65	98	81.00
Teeswater	107	153	100.00
		TOTAL	$259.00

Guernsey Shows:

Zone 1, Essex-Kent, Leamington	104	143	100.00
Zone 2, Wentworth, Ancaster	68	97	77.18
Zone 3, York-Simcoe, Markham	126	150	95.58
Zone 4, Banner County, Paris	73	78	84.00
Halton-Peel, Milton	83	107	56.00
Niagara District, Welland	62	90	91.20
Central Ontario, New Hamburg	51	63	51.60
Western Ontario, Thorndale	46	54	41.60
Ontario Championship Guernsey Show, Simcoe	150	228	100.00
Eastern Ont. Championship Guernsey Show, Chesterville	41	56	60.60
		TOTAL	$757.76

Shorthorn Shows:

Ridgetown	Essex, Elgin, Kent, Norfolk	101	146	$100.00
Stratford	Perth, Huron, Brant, Waterloo, Oxford	72	91	92.80
Clinton Special Shorthorn Show		125	134	100.00
Renfrew	Leeds, Lanark, Renfrew, Carleton Prescott, Russell, Stormont, Glengarry, Grenville, Frontenac, Dundas, Lennox and Addington	74	102	100.00
Erin	Dufferin, Halton, Peel, Haldimand, Lincoln, Wellington, Welland, Wentworth,	98	157	100.00
Strathroy	Lambton, Middlesex, Oxford	88	110	100.00
Owen Sound	Grey, Bruce, Simcoe	108	135	100.00
			Total $	692.80

Summary—1949 Special Cattle Shows:

41	Black & White	$3,773.54
17	Red & White	1,161.34
21	Jersey	1,366.97
3	Hereford	259.00
10	Guernsey	757.76
7	Shorthorn	692.80
		$8,011.41

FREIGHT ASSISTANCE

In order to promote exports of pure bred live stock the Ontario Live Stock Branch assists Ontario breeders showing at foreign exhibitions in an amount equal to 50% of the freight charges. During 1949 the Ontario Dual Purpose Shorthorn Club sent an exhibit to the International Dairy Show at Indianapolis, and received freight assistance from the Ontario Live Stock Branch to the extent of $430.75. Members of the Ontario Shorthorn Club exhibited at the Kansas City Royal, and the freight assistance paid to this group amounted to $218.30. Members of the Ontario Shorthorn and Aberdeen Angus Clubs exhibiting at the Chicago International received freight rebates amounting to $654.65.

The Ontario Live Stock Branch also grants assistance in amounts equal to one-third of the freight charges on carload shipments of pure bred live stock emanating from Ontario and destined to other provinces. The total assistance granted under this policy during the fiscal year amounted to $91.97, and applied to a load of Shorthorns shipped to Melville, Saskatchewan.

DAIRY HERD IMPROVEMENT POLICY

This policy was instituted during the year for the purpose of providing a milk testing service for the owners of grade or mixed herds. When associations consisting of from 24 to 26 members are organized, the Ontario Live Stock Branch provides a supervisor. He is required to visit each herd once per month to weigh the milk of each cow night and morning and test a composite sample on the occasion of each visit. The total production for each cow for the month is computed by multiplying one day's production by the number of milking days in the month. Twenty-nine associations started operations during the year. A high percentage of the members also belong to Artificial Insemination Units. This is highly desirable since it provides a method of appraising the ability of sires maintained by units to transmit higher milk and fat production to their offspring.

KING'S GUINEAS

This coveted award for the Grand Champion Steer in the Boys' and Girls' Baby Beef Calf Club class at the Royal Winter Fair attracted 113 of the best calves from the various clubs in the province. Top honours were won by Duncan Campbell, Moffat, whose winning animal was later sold for $2.00 per pound.

The Ontario Live Stock Branch paid the transportation charges on all calves exhibited and a $20.00 cash prize to each of the prize winners. The prize money amounted to $2,260.00, and transportation charges totalled $700.89.

FEEDER CATTLE SALES

The first feeder cattle sale in Ontario was held at Little Current, Manitoulin Island, during September of 1944. Members of the Ontario Live Stock Branch staff played an important role in the organization of this event. A few years later a co-operative was formed, and this association now handles all details

in connection with the sale. In 1949 it became necessary to expand the sale yards because of the increased number of cattle being offered. The Ontario Live Stock Branch contributed 50% of the cost of the extension, which amounted to $623.50.

During the winter of 1950 a representative of the Branch, together with a member of the Federal Department, met cattle men in the Algoma District, and plans were formulated for holding a similar type of sale. In all probability the first sale in Algoma will be held in 1950.

SWINE

Hog marketings in Canada totalled 4,429,255 head during the calendar year 1949. This was a decline of 7.1% over the previous year. The decline in Western Canada was 18.6% while Eastern Canada registered an increase of .1%. During some of the war years the West produced well over 60% of Canada's hogs. In 1949 Western Canada's production was reduced to 33.8% of the total. Ontario's production has remained relatively stable throughout the past ten years, the variation in any two consecutive years seldom exceeding 5%.

The quality of hogs in all provinces except Quebec and the Maritimes suffered a decline in 1949. The percentage of A's in Ontario dropped from 39.5 in 1948 to 37.4 in 1949, while the percentage of B1's increased by approximately the same percentage as the decline in A's.

Bacon exports for the year were approximately 100,000,000 lbs., the smallest quantity exported from Canada in any year since 1933. This decline could be accounted for by the fact that Canada's hog population has not kept pace with her human population. As a consequence more of the total production is required to meet the demand of the domestic market.

BACON HOG CLUBS

Under the terms of this policy, clubs consisting of at least six members owning a minimum of twenty sows may rent a pure bred sire from the Ontario Live Stock Branch. The rental fee is $10.00 per year for a young boar, or $5.00 per year for an old boar. The cost of the boar and of shipping him to the nearest station of the club caretaker is borne by the Ontario Live Stock Branch. It has been the policy of the Branch to place only boars out of dams qualifying in Advanced Registry. Twenty-five new clubs were organized in 1949-50, and forty-one boars were purchased for new clubs or as replacements. The total purchase price of the boars amounted to $3,737.50, and express charges $274.40.

Herewith follows a tabulation of clubs as of March 31st, 1950:—

County	*Clubs organized 1949-50*	*Clubs operating March 31, 1950*
Bruce	1	4
Carleton	1	2
Dufferin	1	3
Dundas	1	3
Durham	1	1
Essex	2	2
Frontenac		5
Glengarry	2	2
Grenville	--	2
Grey	--	2
Halton	--	2
Hastings	--	6
Huron	--	3

County	*Clubs organized 1949-50*	*Clubs operating March 31, 1950*
Kent	1	2
Lambton	--	2
Lanark	1	4
Leeds	1	8
Lennox & Addington	--	1
Norfolk	1	1
Northumberland	1	1
Ontario	--	1
Peel	--	1
Peterborough	--	1
Prince Edward	1	4
Renfrew	1	5
Russell	--	2
N. Simcoe	1	2
S. Simcoe	1	5
Stormont	1	3
Thunder Bay	--	1
Victoria	6	7
Wellington	--	2
	25	90

DEMONSTRATION HOG PRODUCTION POLICY

Under the terms of this policy representative hog producers were selected in the various counties of the province for the purpose of keeping records relative to the cost of producing hogs. These men are compensated at the rate of $50.00 per sow per year. The total amount paid to co-operators in the project year 1949-50 was $14,225.00. The information supplied by the co-operators was analyzed by the Farm Economics Branch and showed a wide variation in the cost of production.

The following is a summary of the fifty-five co-operators:—

Financial Summary

	18 herds with Low Net Gain per farm	*18 herds with Medium Net Gain per farm*	*19 herds with High Net Gain per farm*	*Average 55 Herds* $	%
Feed Cost	$1627	$1786	$3091	$2185	81
Labour Cost	270	223	351	283	11
Current Expenses	23	27	33	28	1
Capital Charges	167	155	246	190	7
Total Cost	2087	2191	3721	2686	100
Gross Returns	2586	3186	5470	3779	
Net Gain	499	995	1749	1093	

The factors which influenced cost of production were:—

1. Feeding—Those who could get 100 lbs. of pork produced with 390 lbs. or less of feed had higher net gains.
2. Breeding—Those who could wean 15 or more pigs annually per brood sow had highest earnings.
3. Labour—Those who could do all chores on their market hogs with 28 hours or less for every 1,000 lbs. of pork produced (5 hogs) had higher net earnings.
4. Size of herd—No one brood sow can contribute very much earnings, no matter how good. It takes numbers.

5. It takes good balance in all above factors to get best earnings. No one alone could ensure success.

PURE BRED SWINE SALES

Swine Breeders' Clubs holding consignment sales qualify for financial assistance on the basis of $2.00 per animal sold. The following is a summary of the results obtained at sales receiving grants in 1949-50:—

Breeders' Club	*No. Head Sold*	*Grant*	*Average Price*
Dufferin Pure Bred Beef & Swine Breeders' Ass'n.	7	$ 14.00	$130.71
Stratford District A. R. Yorkshire Club	33	66.00	109.62
Southwestern Ontario Yorkshire Club	38	76.00	97.30
Simcoe County Yorkshire Breeders' Club	52	104.00	102.60
Grey-Bruce Yorkshire Club	37	74.00	95.28
Eastern Ontario Yorkshire Breeders	24	48.00	81.90
Waterloo County Advanced Registry Yorkshire Sale	67	134.00	62.68
Ontario Swine Breeders' Association	52	106.00	127.97
8 Sales		$622.00	

Members of the Live Stock Branch staff assisted in selecting animals for the various sales.

REGIONAL SWINE SHOWS

Grants were made available to district Swine Breeders' Clubs for the purpose of assisting them in financing regional shows, on the basis of 25% of the prize money paid out, up to a maximum of $100.00 per show.

The following is a summary of the entries and grants for these shows receiving assistance in 1949-50:—

Zone	*Place*	*No. of Swine*	*No. of Entries*	*Grant*
1	Strathroy	76	94	$ 93.75
2	Teeswater	65	85	100.00
3	Brantford	82	92	100.00
4	Collingwood	107	131	100.00
5	Oshawa	63	90	93.75
6	Ottawa	94	102	100.00
Championship Yorkshire Show, Erin		133	170	100.00
Championship Berkshire Show, Leamington		72	92	100.00
Championship Tamworth Show, Markham		73	95	100.00
			9 Shows:	$887.50

BOAR PREMIUM POLICY

This policy was instituted in 1949 for the purpose of giving recognition to those boars that possess the ability to sire top quality market hogs. A boar owner may enroll his boar at any time, preferably about the time his oldest progeny are ready for market. He is required to keep, or obtain grading statements for all progeny marketed during the 12 months following the date of enrolment. The premium is based on the number and quality of hogs marketed during that period. A boar used for public service must sire at least 45% A's before being eligible for premium. A boar used exclusively on the herd of the owner must sire 60% A's in order to qualify. Forty-nine boars were enrolled during the year. Any boars qualifying will receive premiums during the fiscal year 1950-51.

SHEEP

The inspected slaughter of sheep and lambs in Canada during 1949 totalled 629,978 head. This was a decrease of 17.9% from the previous year. Such a trend might indicate that more of the ewe lambs born in the current year were held back for breeding purposes. It might also mean that the sheep population had declined to the point where fewer lambs were produced. On the basis of wool marketings, the latter possibility appears to be correct. The total clip in 1949 amounted to 7.8 million pounds, as compared with 8.4 million pounds in 1948.

As the sheep population has declined, lamb prices have advanced, reaching an all time high early in 1950. Canada is now producing less than 3½ lbs. of lamb per capita. It would therefore appear that the sheep industry could be greatly expanded without fear of creating surpluses.

SHEEP SALES

Sheep Breeders' Clubs holding consignment sales are eligible for grants on the basis of $1.00 per head or lot sold. Two sales were held in 1949 as follows:—

Ottawa Valley Sheep Breeders' Association	Grant $37.00
Ontario Sheep Breeders' Association	Grant $67.00

REGIONAL SHEEP SHOWS

The Ontario Live Stock Branch makes grants available to local Sheep Breeders' Clubs holding regional shows on the basis of 25% of the prize money paid out up to a maximum of $100.00. Herewith follows a summary of shows receiving assistance in 1949-50:—

Zone	*Place*	*No. of Sheep*	*No. of Entries*	*Grant*
1	Melbourne	207	227	$100.00
2	Owen Sound	171	253	100.00
3	Brantford	206	210	100.00
4	Markham	231	292	100.00
5	Ottawa	169	226	100.00
			5 Shows:	$500.00

LAMB FAIRS

During the past twenty years a great many lamb fairs have been held in Northern Ontario in co-operation with representatives of the Federal Department of Agriculture and local sheep raisers. These shows are intended to encourage the production of better quality lamb and improve systems of marketing. Invariably after a number of shows have been held the local people have organized co-operatives and assumed responsibility for marketing. As a consequence only one show was held in 1949, namely, the show at Uno Park in Temiskaming District. The Ontario Live Stock Branch contributed $30.00 toward the prize money at this event.

Special grading and shipping days were held at various points in Northern and Eastern Ontario. The lambs brought out by our local farmers were graded and offered by tender on a graded basis. In all cases the prices received were well above those being paid locally. As a result many sheep raisers in these areas ordered pure bred rams in the hope of improving the quality of lamb produced in 1950.

FREIGHT ASSISTANCE

Several Ontario sheep breeders added to the province's laurels by winning many of the top prizes in the various classes at the Chicago International Exposi-

tion. These men were reimbursed for transportation charges to the extent of 50% of their freight. The total remittance amounted to $284.30.

DEMONSTRATION SHEEP FLOCKS

During 1949 a cost of production study was introduced in respect to sheep. One co-operator was located. This man has a large flock and is depending upon it as a major source of livelihood. He is required to keep accurate records of the cost of production and is expected to follow management practices recommended by officers of this Branch, and disease control methods recommended by the Ontario Veterinary College. The results of the project will not be available until the latter part of 1950. In the meantime it is planned to enlist other co-operators in this work in order that the results may be more representative.

DOG TAX AND LIVE STOCK PROTECTION ACT

Under the terms of this Act municipalities are required to reimburse persons having live stock killed or injured by dogs for losses sustained. In the event that a municipal council or the owner of the live stock is dissatisfied with the local valuer's award, an appeal may be filed with the Minister. On receipt of an appeal the Minister is obligated to appoint a valuer to assess the damage and the award of such valuer is final. During the fiscal year 1949-50 six appeals were received.

BRAND ACT

Under the terms of this Act no person may brand live stock or poultry unless a brand has been allocated by the Live Stock Commissioner. All brands are allotted for a period of three years and are renewable at the end of that time. During the year nine brands were allotted for cattle and sixteen for poultry, while forty-eight brands for poultry were renewed.

POULTRY ASSOCIATIONS

The Ontario Live Stock Branch makes grants to local poultry associations on the basis of $1.00 per resident member, up to a maximum of $50.00 per association. The money so granted is usually used to supplement prize lists at shows sponsored by the associations. The Branch also contributes towards the services and expenses of lecturers attending association meetings and judges at poultry shows. Grants in 1949-50 totalled $626.25, and $426.91 was expended on services and expenses of lecturers and judges.

LIVE STOCK ASSOCIATIONS

Members of the Ontario Live Stock Branch staff serve as secretary for the following associations:—

Ontario Horse Breeders' Association
Ontario Cattle Breeders' Association
Ontario Sheep Breeders' Association
Ontario Swine Breeders' Association
Ontario Hereford Breeders' Association
Ontario Beef Cattle Improvement Association

The executive work of these associations is carried out by the secretary.

THE MILK CONTROL BOARD

Foreword

The Milk Control Act of 1948 provided for a Board to act as a judicial body on certain matters as set out in the Act relating to the fluid milk industry in Ontario. The Board took office in January, 1949, and consisted of three members, Judge A. B. Currey of Gore Bay as Chairman and Messrs. K. M. Betzner of Waterloo and M. G. Hart of Oshawa as members. This Board has carried on for the fiscal year and has held meetings twice monthly. The Act also provided for an Administrative Officer under the direction of the Board, who is responsible for the administration of the Act, the regulations under the Act and the rulings of the Board.

The new Board, having a new Act to administer, required new regulations in accordance with the authority in the Act and considerable time was devoted in meeting with various groups in the industry for the purpose of drafting new regulations. The regulations, as well as the Act, were not familiar to the industry and as a consequence many points in question had to be clarified in order to acquaint milk producers, distributors, processors and transporters of milk with the new law. The industry, on the whole, has displayed a co-operative attitude to the new Act, and the Board has appreciated this and the honest endeavour to become conversant with the main features of the legislation and the principal problems involved.

Legislation

The 1948 Act was amended at the 1949 session of the Legislature and the Amendments, as set out in Bill 179, received Royal Assent.

At the 1950 session of the Legislature, Bill 86 was passed, further amending the Act.

These amendments in the main clarified certain matters pertaining to the Collective Bargaining provisions of the Act, the procedure upon application for the establishment of Milk Marketing Agencies, and authority to restrict the licences of distributors as to areas in which distributors may sell milk.

Regulations

Ontario Regulations 27/49 were amended by Ontario Regulations 85/49 and were filed with the Registrar of Regulations on the 23rd day of May, 1949.

Ontario Regulations 40/50, further amending Ontario Regulations 27/49, were filed with the Registrar of Regulations on the 27th day of February, 1950.

The main features of these amendments provided,—

(1) Authority to require distributors to weigh and sample all milk received from each producer daily and to sample for a period of sixteen days only and test for butter-fat twice monthly.

(2) Authority to administer securities deposited with the Board for the payment of unpaid claims of producers for milk sold to distributors.

Meetings of the Board and Administrative Officer

During the year meetings were held as follows,—

(1) Meetings having to do with fluid and manufacturing milk matters	24
(2) Registered notices of Hearings before the Board	106
(3) Interviews with Administrator in office	231
(4) Attendance by Administrator at field meetings	96

Licences Issued

Year	*Regular Distributor*	*Producer Distributor*	*Peddler*	*Milk Transporters*	*Milk Manufacturers*	*Total*
1934	Not Differentiated					1,335
1935	Not Differentiated					1,624
1936	647	861	87	177	28	1,800
1937	750	924	87	205	32	1,998
1938	598	850	90	220	36	1,794
1939	607	590	150	235	38	1,620
1940	610	572	129	231	40	1,582
1941	635	490	116	230	40	1,511
1942	624	440	100	182	43	1,389
1943	610	452	125	181	43	1,411
1944	615	415	72	184	46	1,332
1945	624	389	76	239	46	1,374
1946	642	346	83	264	48	1,383
1947	641	237	83	283	55	1,299
1948	630	192	86	272	53	1,233
1949	603	154	75	273	51	1,156

Bonding

The Ontario Milk Distributors Association and the Toronto Milk Distributors Association registered strong objections to the bonding provisions of the Act and Regulations, claiming that they placed an unfair burden on milk distributors. Negotiations were carried on between the Distributors and the Ontairo Whole Milk Producers League to see if some alternative to the present regulations could be agreed to, but no agreement was reached. The Board convened different meetings of distributors and producers on this problem and took the position throughout the negotiations that it would be necessary to receive an agreement on proposed changes to the regulations before it would consider any amendment to the bonding regulations. As these negotiations were in process at the beginning of the calendar year, there was considerable delay by some distributors in the filing of securities with the Board and this situation necessitated a great deal of extra administrative work for the staff.

The bonding regulations require a distributor to file a bond for the calendar year and we give herewith data on the calendar year 1949:—

Value of surety and government bonds on deposit with the Board — $5,388,280.00.

Bonds of distributors called during the year to pay claims of producers:—

Distributor No. 1	$1,540.71
Distributor No. 2	695.65

Field Work

(a) Local Fieldmen—

A staff of ten fieldmen, with headquarters in their respective districts, conducted periodic checking of the weighing, sampling and butter-fat testing of producers' milk, the records respecting payments by distributors for milk purchased from producers and general enforcement of the regulations.

Statistical data on work performed for the calendar year 1949 is as follows,—

	1949
Mileage travelled	137,734
Composite tests of milk checked	27,174
Number of fresh samples tested	3,142
Number of tests of retail products	3,228

Errors corrected	455
Value of errors corrected	$2,089.88
Routine reports on "milk receiving"	485
Routine reports on "milk payments"	976
Routine reports on "producer-distributors"	101
Miscellaneous visits at farms	207
Miscellaneous visits at plants	946
Miscellaneous visits at others	250
Special complaints investigated	73

(b) Head Office Fieldmen—

A staff of two fieldmen devoted the major portion of their time in the making of complete audits of payments by distributors for milk purchased from producers to see that the terms of the Collective Bargaining agreements or awards of Boards of Arbitration are observed. There are many special situations on which the Board requires specific information and for the most part these two men conduct these investigations and report to the Board. Court proceedings which were instituted during the year also necessitated a great deal of time on the part of the two men.

Statistical data on the work performed for the calendar year 1949 is as follows:—

	1949
Payment Audits:	
Routine	631
Follow-up	66
Special Audits	60
Errors corrected:	
Number	111
Value	$10,502.87
Special plant calls	491
Special investigations	83
Miscellaneous calls:	
Farms	119
Producer Associations	55
Distributor Associations	9
Other calls	187
Mileage travelled	41,394

COLLECTIVE BARGAINING AGREEMENTS

(a) *Fluid Milk Markets*

The milk producers and distributors negotiated and filed with the Board agreements for the following markets providing for the prices as indicated in Table No. 1. The majority of these agreements continued in effect the legal fluid prices in former collective bargaining agreements or awards which had expired. The secondary prices are considerably lower than in former agreements as a result of the decrease in the prices provided in the collective bargaining agreements for concentrated milk markets. A new departure in many of these agreements is the inclusion in the fluid price of all in some cases, or a percentage in others, of the milk used in chocolate drink, buttermilk and skim milk sold to consumers. In former agreements the milk used for these purposes was purchased at a secondary price.

TABLE No. 1.

Price per 100 pounds

Market	C.B. Agreement	Award	Fluid	Secondary
Acton		49-1	$4.00	**
	49-83		4.00	**
Ailsa Craig	49-59		3.75	
Alliston	49-49		4.00	**
Arnprior	49-29		3.90	**
	49-78		3.90	**
Arthur	49-48		3.60	
Aurora	49-11		3.95	
Aylmer		49-1	4.00	**
	49-50		4.00	**
Barrie		49-1	4.00	**
	49-50		4.00	**
Belleville		49-5	3.75	**
	49-54		3.95	**
Blind River	49-26		4.50	
Blyth	49-4		3.65	
Bowmanville	49-50		4.00	**
	49-15		4.00	**
Bracebridge		49-1	4.00	**
Brampton		49-1	4.00	**
	49-50		4.00	**
Brantford		49-1	4.00	**
	49-60		4.00	**
Brighton		49-6	3.75	**
	49-75		3.95	**
Brockville		49-1	4.00	**
	49-50		4.00	**
Burlington		49-4	4.15	**
	49-56		4.15	**
Caledonia		49-9	3.85 at Farm	**
	49-61		4.05	**
Campbellford		49-1	4.00	**
Clinton	49-8		4.00	**

Market	C.B. Agreement	Award	Fluid	Secondary
Cobourg		49-1	4.00	**
	49-50		4.00	**
Collingwood		49-1	4.00	**
Cornwall		49-1	4.00	**
	49-50		4.00	**
Delhi		49-1	4.00	**
Dundas		49-4	4.15	**
	49-56		4.15	**
Dunnville		49-1	4.00	**
	49-87		4.00	**
Dryden	49-72		4.25	$3.00
Essex	49-22		4.00	**
Exeter	49-9		4.00	**
	49-79		4.00	**
Fort Frances	49-43			2.50
	49-73		4.20	(72c lb. B.F.)
Fort William	49-21		4.58	3.28
Port Arthur	49-86		4.58	3.28
Frankford		49-6	3.75	**
	49-50		4.00	**
Galt	49-57		4.00	**
Gananoque	49-38		3.75	2.90
Georgetown		49-1	4.00	**
	49-50		4.00	**
Goderich		49-1	4.00	**
Gravenhurst		49-1	4.00	**
	49-50		4.00	**
Grimsby		49-4	4.15	**
	49-56		4.15	**
Guelph	49-57		4.00	**
Hamilton		49-4	4.15	**
	49-56		4.15	**
Hanover	49-88		3.90	**

Market	C.B. Agreement	Award	Fluid	Secondary
Hawkesbury		49-1	3.85	**
	49-50		4.00	**
Hensall	49-12		3.90	**
Huntsville	49-50		4.00	**
Ingersoll	49-46		3.75	**
	49-65		3.90	**
Kapuskasing	49-85		4.25	(Cry. B.F.)
Keewatin	49-47		4.60	3.50
Kenora				
Kent County	49-2		4.00	**
	49-74		4.00	**
Kingston		49-1	4.00	**
Kirkland Lake	49-24		4.20	3.00
Grade 1	49-67		4.23½	2.73½
Grade 2			4.20	2.70
Grade 3			4.16½	2.66½
Grade 4			4.13	2.63
Kitchener-Waterloo	49-58		4.00	**
Lambton County	49-2		4.00	**
	49-74		4.00	**
Leamington	49-23		4.00	**
	49-80		4.00	**
Lincoln County (except Grimsby)	49-55		4.15	**
Lindsay		49-1	4.00	**
	49-50		4.00	**
Listowel		49-7	3.80	
	49-51		3.90	**
London	49-45		3.90	2.90
Madoc	49-6		3.30	
Markham	49-27		3.85	
Meaford / Thornbury		49-1	4.00	**
Midland / Penetang		49-1	4.00	**
Napanee		49-1	3.75	**
	49-68		3.95	**
Newmarket		49-1	4.00	**
	49-82		4.00	**
Niagara Dist.		49-3	4.15	**
	49-55		4.15	**
Niagara Falls		49-3	4.15	**
	49-55		4.15	**
North Bay	49-16		4.10	**
	49-77		4.10	**
North Muskoka		49-1	4.00	**
Oakville		49-1	4.15	**
	49-50		4.15	**
Orillia		49-1	4.00	**
	49-70		3.95	**
Oshawa	49-15		4.00	**
	49-50		4.00	**
Ottawa	49-3		4.05	**
	49-65		4.05	**
Owen Sound		49-1	4.00	**
	49-50		4.00	**
Palmerston	49-17		3.65	
Paris		49-1	4.00	**
	49-50		4.00	**
Pembroke		49-1	4.00	**
Perth	49-40		3.60	
Peterborough		49-1	4.00	**
	49-84		4.00	**
Pickering	49-15		4.00	**
Picton		49-1	3.85	**
	49-69		3.85	**
Port Colborne		49-3	4.15	**
	49-55		4.15	**
Port Elgin		49-1	4.00	**
	49-50		4.00	**

Market	C.B. Agreement	Award	Fluid	Secondary
Port Hope		49-1	4.00	**
	49-32		3.90	3.00
	49-63		4.00	**
Port Perry	49-35		3.90	2.65
Renfrew	49-50		4.00	**
Richmond Hill	49-7		4.00	**
St. Catharines		49-3	4.15	**
	49-55		4.15	**
St. George	49-66		3.80	**
St. Mary's		49-1	4.00	**
	49-71		4.00	**
St. Thomas		49-1	4.00	**
	49-50		4.00	**
Sault Ste. Marie	49-1		4.50	
	49-81		4.50	
Schreiber	49-48		4.13	
Seaforth	49-10		4.00	**
Simcoe Waterford		49-1	4.00	**
	49-50		4.00	**
Smiths Falls		49-1	4.00	**
	49-50		4.00	**
Southampton		49-1	4.00	**
Stoney Creek		49-4	4.15	**
	49-56		4.15	**
Stouffville	49-15		4.00	**
	49-33		3.85	
Stratford		49-1	4.00	**
	49-50		4.00	**

Market	C.B. Agreement	Award	Fluid	Secondary
Sutton		49-1	4.00	**
Thorold	49-55		4.15	**
Merritton		49-3	4.15	**
Tillsonburg		49-1	4.00	**
	49-50		4.00	**
Timmins	49-25		4.79	2.90
Toronto		49-2	4.05	3.15
	49-31		4.07½	**
	49-52		4.07½	**
Tottenham	49-18		3.50	
Trenton		49-6	3.75	**
	49-62		3.95	**
Tweed	49-19		3.50	
Waterdown		49-4	4.15	**
	49-56		4.15	**
Welland		49-3	4.15	**
	49-55		4.15	**
Welland County (Excepting Fort Erie)		49-3	4.15	**
	49-55		4.15	**
Whitby	49-15		4.00	**
	49-50		4.00	**
Wiarton		49-1	4.00	**
	49-76		4.00	**
Windsor	49-41		4.05	2.90
Wingham	49-13		4.00	**
Woodstock	49-5		3.90	3.15
Zurich	49-14		3.65	**

In the markets marked by the sign ** the agreements included a price, for milk purchased by distributors in excess of dairy requirements or quotas, the same as the price provided in the Collective Bargaining agreements reached between concentrated milk producers and processors as follows:—

April 1, 1949, to April 11, 1949	$2.75 per 100 lbs. of milk testing 3.5% B.F.
April 12, 1949, to June 10, 1949	2.50 per 100 lbs. of milk testing 3.5% B.F.
June 11, 1949, to March 31, 1950	2.40 per 100 lbs. of milk testing 3.5% B.F.

(b) *Concentrated Milk Products*

The producers of milk supplying processors of concentrated milk products experienced a sharp decrease in prices for their milk supply. The year 1948 was the most favourable year on record in regard to prices for producers and for export sales of concentrated milk products. The minimum price per 100 pounds of $3.05 in 1948 decreased to a low of $2.50 for evaporated milk and $2.40 for other uses. The manufacture of products in the first few months of 1949 continued at a higher level than for the corresponding months of 1948. While this was going on the sale of products slowed up, especially in the export market. Faced with heavy stocks on hand and shrinking export markets, the processors curtailed their make and for the remainder of the year production lagged behind and total production for the year was lower than the record high of 1948. Exports are an important part of the concentrated milk industry in Ontario and Canada as a whole and 1949 saw a return to highly competitive conditions internationally. Other countries, such as the Netherlands and Denmark, are getting back to pre-war production and their exports increased. Australia, New Zealand and the United States have increased their production of concentrated milks and are competing strongly for export markets. Exchange and International Currency problems have accounted for the loss of markets which have been supplied from Canada for years.

Under these circumstances the processors of concentrated milk products sought Collective Bargaining with the Ontario Concentrated Milk Producers Association for reduced prices. Agreements were reached and filed with the Board as follows:—

C.B. Agreement	*Effective Date*	*For Concentrated Milk Products Other than Evaporated*	*For Evaporated and Sweetened Condensed*
49-28	Mar. 23/49	$2.75 per cwt.	
49-30	Apr. 1/49		$2.90 per cwt.
		For Concentrated Milk Products Other than Evaporated and Sweetened Condensed	
49-34	Apr. 12/49	$2.50 per cwt.	
49-36	Apr. 16/49		$2.90 per cwt. for domestic consumption 2.65 per cwt. for export
49-39	May 10/49		$2.75 per cwt. for domestic consumption 2.60 per cwt. for export
49-42	June 11/49	$2.40 per cwt.	
49-44	June 16/49		$2.70 per cwt. for domestic consumption 2.50 per cwt. for export

While the industry was considerably disturbed in 1949, it is very gratifying to note that the picture for the first quarter of 1950 is much better. Stocks are not unduly high and evaporated milk stocks are very much lower than a year ago. Exports improved and domestic consumption has increased very materially due to the acquisition of the Newfoundland market for evaporated milk which

was formerly supplied from the United States. These conditions, together with curtailed production present a stronger position in the concentrated milk industry.

(c) *Transportation*

Collective Bargaining agreements covering the prices to be paid to transporters for transporting the milk of producers were reached between the transporters and producers in the following markets:—

Whitby Windsor Guelph.

Arbitration Awards

Boards of Arbitration were constituted in a number of markets where Collective Bargaining negotiations failed. Awards were filed with the Board covering the markets as indicated in Table No. 1.

Enforcement

Direction was given our fieldmen to institute prosecutions against a number of licensees where regulations were not being followed, or the requirements for a license were not met by applicants. Of some thirty-five informations taken out, it was only necessary for the Magistrate to convict five licensees for operating without a licence.

Pursuant to Section 16 of the Act, the Board made application to the Supreme Court for an injunction to restrain Valley Dairy Limited, Stinson's Dairy Limited, David L. MacDonald, Victor M. Moore and Myrtle Moore, all of Ottawa, from operating.

The Court gave an order to go for injunction as against Valley Dairy Limited and David L. MacDonald. As to Stinson's Dairy Limited the Court gave them two weeks to meet the requirements for a licence, failing which the application for an injunction was not to be opposed.

Stinson's Dairy Limited filed a bond with the board and received a licence.

FLUID MILK SALES (QUARTS) IN ONTARIO

Year	*Yearly*	*Average Monthly*	*Average Daily*
1938	240,465,400	20,038,783	658,809
1939	250,406,200	20,867,183	686,044
1940	269,203,700	22,433,641	737,544
1941	290,089,400	24,174,116	794,765
1942	325,159,100	27,096,591	881,107
1943	386,644,500	32,220,375	1,059,300
1944	409,964,000	34,163,666	1,121,499
1945	432,857,000	36,071,416	1,185,909
1946	467,736,000	38,978,000	1,281,468
1947	436,459,000	36,371,583	1,195,778
1948	424,100,000	35,341,666	1,161,917
1949	433,005,000	36,083,750	1,186,315

From Monthly Dairy Report, Ontario Department of Agriculture.

COMMERCIAL SALES OF FLUID MILK, CREAM, CHOCOLATE DAIRY DRINK AND BUTTERMILK BY YEARS IN ONTARIO

	Fluid		*Fluid Cream*		*Chocolate Dairy Drink*	*Butter-Milk*
Year	*Quarts*	*Sales Value*	*Quarts*	*Sales Value*	*Quarts*	*Quarts*
1947	436,459,000	66,881,000	13,496,000	8,302,000	11,880,000	5,024,000
1948	424,100,000	73,238,000	12,722,000	8,609,000	10,988,000	4,768,000
1949	433,005,000	78,076,000	12,985,000	9,134,000	11,049,000	5,410,000

From Monthly Dairy Report, Ontario Department of Agriculture.

NORTHERN ONTARIO DEVELOPMENT

Farmers and Settlers in Northern Ontario again participated in the various policies of the Department inaugurated several years ago to encourage and assist in the development of a sound and practical agriculture.

LAND CLEARING AND BREAKING

To encourage the clearing and breaking of land in Northern Ontario Districts, land owners who were bona fide farmers or settlers were offered a subsidy of 50% of the cost, up to a maximum of $12.00 per acre, for clearing land and $6.00 per acre for breaking land, providing that the subsidy was limited to a maximum of 10 acres of land cleared or broken during the year. No subsidy was granted to farmers with 80 or more acres under the plow.

The following presents a statement showing the number of farmers assisted, the acreage cleared and broken, and the subsidy paid:

		Acres		*Subsidy Granted*		*Total Subsidy Paid*
District	*Total*	*Cleared*	*Broken*	*Clearing*	*Breaking*	
Algoma	82	458½	404	$ 5,307.70	$ 2,274.93	$ 7,582.63
Cochrane	1,037	5,803¾	5,230	68,135.32	31,009.72	99,145.04
Kenora	132	747¼	627¼	6,915.86	3,143.50	10,059.36
Manitoulin	93	610¾	424½	7,219.58	2,314.10	9,533.68
Muskoka	9	57	49½	568.80	260.80	829.60
Nipissing	97	547¼	415¼	6,335.39	2,432.97	8,768.36
Parry Sound	22	125½	107½	1,483.97	643.40	2,127.37
Rainy River	242	1,851¼	1,603	19,843.90	8,927.26	28,771.16
Sudbury	148	734½	672¾	8,636.55	3,923.16	12,559.71
Temiskaming	323	2,264¾	2,188¼	26,133.12	12,595.86	38,728.98
Thunder Bay	309	1,988½	1,696	21,341.78	8,882.23	30,224.01
	2,494	15,189	13,418	$171,921.97	$76,407.93	$248,329.90

Average Subsidy paid per settler for clearing	$75.37
Average Subsidy paid per settler for breaking	37.45
Average Subsidy paid per settler for clearing and breaking	99.53
Average Acreage cleared per settler	6-2/3 acres
Average Acreage broken per settler	6-1/2 acres
Average Subsidy paid per acre for clearing	$11.32
Average Subsidy paid per acre for breaking	5.69
Average Cost per acre to farmer for clearing	27.21
Average Cost per acre to farmer for breaking	13.95

DRAINAGE AND DRAINAGE OUTLETS

The policy of Drainage and Drainage Outlets was designed to construct main ditches to provide adequate outlets to carry water off farms. This necessitated, in many instances, opening up natural water courses by clearing them of dead trees and debris to allow a natural flow of water off farm lands. Applications were channelled through the Township Councils in organized Townships and through local School Boards in unorganized Townships. Farmers benefiting by the drainage outlets were required to arrange for the necessary right-of-way and maintain the ditches when constructed.

The following table gives a summarized statement of the ditches constructed during the past fiscal year in the various Districts of Northern Ontario and shows the number of farmers benefited as well as the acreage drained:

District	*Linear Feet of Ditching*	*No. Farmers Benefited*	*Acreage Drained*	*Expenditure*
Algoma	115,440 ft. or 21.86 miles	86	8,860	$ 38,534.60
Cochrane	316,286 ft. or 59.90 miles	382	30,086	78,122.75
Kenora	20,507 ft. or 3.88 miles	16	385	9,730.11
Manitoulin	162,971 ft. or 30.86 miles	91	11,615	47,622.81
Muskoka	41,575 ft. or 7.87 miles	26	2,200	26,895.50
Nipissing	136,139 ft. or 25.78 miles	98	8,670	47,617.33
Parry Sound	44,943 ft. or 8.51 miles	21	2,675	20,156.14
Rainy River	121,047 ft. or 22.92 miles	113	14,814	54,652.71
Sudbury	122,010 ft. or 23.10 miles	117	11,670	40,427.43
Temiskaming	97,153 ft. or 18.40 miles	61	7,065	35,352.56
Thunder Bay	14,936 ft. or 2.82 miles	17	397	3,160.10
	1,193,007 ft. or 226 miles	1,028	98,437	$402,272.04
			Advertising	$ 253.23
Or: At cost of 33.7 cents per linear foot.				$402,525.27

DRILLING OF WELLS

Because of the difficulty of securing adequate supplies of water on farms in Northern Ontario Districts, a policy was established two years ago of giving some assistance to farmers in drilling wells on their farms.

Under this policy the Department offered a subsidy of 50% of the cost of drilling wells in excess of $200.00 to bona fide farmers provided that the maximum assistance for a drilled well on any property did not exceed $300.00.

A total of 122 farmers were assisted during the past year. The following table shows the average cost of drilling a well to the farmer, as well as the subsidies paid by Districts:

District	*No. of Settlers Assisted*	*Average Cost of Drilling Well to Settler*	*Average Subsidy Paid to Settler*	*Total Subsidies Paid to Settlers*
Algoma	3	$296.32	$ 48.16	$ 144.47
Cochrane	40	520.13	151.09	6,043.65
Manitoulin	7	338.93	59.82	418.79
Nipissing	9	368.87	95.55	859.92
Parry Sound	1	578.00	189.00	189.00
Rainy River	5	316.09	58.05	290.24
Sudbury	3	813.57	273.70	821.10
Temiskaming	44	727.49	242.48	10,669.37
Thunder Bay	10	782.37	189.06	1,890.62
	122	Average $587.40	Average $174.81	$21,327.16

POTATO SPRAYING, DUSTING AND GRADING MACHINERY

To promote improvement of potato production and marketing in Northern Ontario, the Department offered assistance to Co-operative Organizations in the form of a grant of 50% of the cost of potato grading, spraying and dusting machinery up to a maximum of $350.00, together with 50% of the railway freight charges on such equipment to destination.

During the past year assistance was granted on one potato grader to the Co-operative Association at Hanmer, in the Sudbury District.

LIVE STOCK ASSISTANCE

Under the Live Stock Assistance Policy, farmers have been encouraged to purchase more live stock from Southern Ontario to consume the great quantity of feed available in the District and to swell their returns from good husbandry practices. Assistance was granted in the form of the payment of freight on carload lots of live stock, and the travelling expenses of one man from Northern Ontario to select such live stock.

During the past year a total of 498 head of cattle were brought in to the District, in which 135 farmers participated. The following table tells the story by Districts:

District	*No. Cattle Purchased*	*No. Farmers Participating*
Cochrane	238	66
Nipissing	58	16
Parry Sound	9	3
Sudbury	71	24
Temiskaming	107	22
Thunder Bay	15	4
	498	135

VETERINARY ASSISTANCE

A co-operative plan with the Municipalities is carried out under an agreement between a Veterinary Agricultural Committee and a Veterinarian, under which the municipalities agree to contribute to a fund from which regular monthly payments totalling from $1,200.00 to $1,600.00 are made to the Veterinarian. The Ontario Department of Agriculture contributes dollar for dollar from $1,200.00 up to $1,600.00.

In Kenora District the grant is $1,200.00; in Manitoulin, $1,500.00; in Algoma, $1,600.00; and in all other Districts the grant is $1,400.00.

Subsidized Veterinary Units are now operating in the following Districts of Northern Ontario:

District	*Date Established*	*Name and Address of Veterinarian*
Algoma	July 1, 1945	Dr. W. P. Brisbane, Desbarats
Cochrane	December 1, 1946	Dr. J. P. Thompson, Matheson
Kenora	January 15, 1945	Dr. M. H. Horwill, Kenora
Manitoulin	October 16, 1946	Dr. S. J. Morrison, Gore Bay
Muskoka	June 16, 1947	Dr. W. C. Stiles, Bracebridge
Parry Sound	June 1, 1949	Dr. A. P. Christie, Burks Falls
Rainy River	June 1, 1946	Dr. W. L. Hill, Fort Frances
Temiskaming	April 8, 1946	Dr. F. C. Nelson, New Liskeard
Thunder Bay	July 1, 1948	Dr. R. I. Sinclair, Fort Wililam

This plan provides an excellent service for live stock owners at reasonable schedule of fees set out in the Agreement, and the plan is filling a long-felt need in Northern Ontario.

FREIGHT ASSISTANCE ON NORTHERN GROWN SEED POTATOES

To provide assistance to farmers in Northern Ontario in the marketing of Foundation, Foundation "A" or Certified grade seed potatoes, and likewise to encourage the use of Northern grown seed potatoes by farmers in Southern Ontario, the Department instituted a policy of paying 50% of the freight on carload lots of such seed from any section in Northern Ontario north of North Bay, to any point in Ontario where seed potatoes were required. This assistance was offered only on seed potatoes purchased by a grower or group of farmers.

During the past year assistance was granted on three carloads of seed potatoes shipped from the Cochrane District to the Sudbury Crop Improvement Association; the Durham County 500-Bushel Club; and the North Simcoe Seed Potato Growers' Association.

SPECIAL GRANTS TO CO-OPERATIVE ASSOCIATIONS AND COMMUNITY HALLS

During the past year special grants were given to certain Co-operative Organizations to assist them in becoming properly established to serve the farmers. In a few instances grants were given to assist in the building of Community Halls in unorganized districts where the Community Halls' Act does not apply: and in one case a grant was given to drill a well on a demonstration basis.

The grants given during the past year are listed below:

District	*Name of Organization*	*Amount of Grant*
Cochrane	Hearst Farmers' Co-operative, Hearst	$ 5,000.00
	Community Hall, Township of Tisdale, South Porcupine	5,000.00
	Digging Well at R. C. Union Separate School, Moonbeam	300.00
Kenora	Community Hall, Amesdale Women's Institute, Amesdale	500.00
	Community Hall, Redditt Women's Institute, Redditt	500.00
	Community Hall, S.S. No. 1, Village of Hudson	2,000.00
Sudbury	Co-operative de Hanmer, Hanmer	10,000.00

SPECIAL GRANTS TO OTHER BRANCHES OF THE ONTARIO DEPARTMENT OF AGRICULTURE

Agricultural Societies

Special grants not provided in the estimates were given to local Agricultural Societies to assist them to function and enlarge their educational programmes in Districts and areas where the population is sparse.

These grants during the past year amounted to $3,753.00.

Women's Institute Branch and Home Economics Service

Because of the cost of travel to Convention Areas in various Districts of Northern Ontario, and the importance of the conventions from an educational viewpoint, arrangements were made to pay the transportation expenses of one official delegate from each Branch of Women's Institutes in Northern Ontario to the area convention.

This has been not only greatly appreciated by the Northern Ontario Branches, but it has strengthened the Women's Institute organization and enlarged their programme.

These travelling expenses during the past year amounted to $1,101.65.

ONTARIO FARM SERVICE FORCE

The work of the Ontario Farm Service Force is divided into six different departments, namely (1) Individual Placements, (2) Family Placements, (3) Day-by-Day Work at West Toronto, (4) Farm Commando Work at Chatham and Stratford, (5) Ontario Farm Service Force Camps, (6) Reception, distribution, and supervision of Western and Eastern Harvesters in Ottawa.

1. Individual Placements:

During the year there have been placed on individual farms 800 boys and men and 15 girls. Married couples number of placements 50, number of people placed 150.

These placements, as in former years, have been very well spread throughout forty counties in Ontario. The biggest proportion of them, of course, are in Central Ontario. These individual placements range from two or three months to year round placements. Many of them become permanent placements on the farm and in recent years we have been getting applications from some of them for help such as they were when we first placed them.

2. Family Placements:

During the year fifty married couples or families were placed in year round employment mostly in separate houses. These families this year have been mostly Canadian, but now and then we have British families referred to us by the Canadian National Railways and the National Employment Service.

3. Day-by-Day Work — West Toronto:

1949 is the ninth consecutive year during which we have operated this Day-by-Day service. It is a service to the truck farmers and fruit growers located in the area west of Toronto within a radius of 15 or 20 miles. This work has steadily grown in extent, scope and efficiency. It reached its peak in 1948, but due to the weather conditions the demand has only been half what it was in 1948. The work usually starts about April 1st and closes about the second Saturday in November. Every morning except Sunday, an officer is in charge of the work at the corner of Bloor and Jane Streets. The officer is there for one or two hours in the morning, depending on the crop season. We usually start the service when there is a demand for at least 15 workers. The number supplied usually reaches its peak during the strawberry season. This year because of the weather conditions there was less than half the demand for strawberry pickers than we had in 1948. Usually the end of the season sees about 40 workers going out each morning. By that time they are pretty well settled in with some particular grower and as these growers continue to pick up the same workers each morning, we consider that the services of our officer are no longer required for distribution. The operation of this service is under a Committee of the growers who work along with our placement officer.

The extent of the work can be quickly seen by the following figures:

Season April 1st to November 12th.

Number of Growers registered, 128. Number served, 112.

Workers registered—		Number who worked—	
Girls and women	756	Girls and women	502
Boys and men	1,339	Boys and men	867
	2,095		1,369

Total number of days' work April 1st to November 12th, 10,304.

Biggest day, 43 growers — 263 workers.

The insurance of workers plan which was introduced in 1946 is once again in operation this year. This insures the growers and Government against employers' liability and the workers for accident insurance. The advance premium of $250.00 is paid by the Government and at the end of the season the balance is paid on the basis of 3.16c per worker per day. The growers pay an advance premium of $1.00 or $2.00 each when they register in the Spring. These amounts are paid according as they have received less than 100 days' service or over 100 days' service during the previous season. This insurance covers liability of individual growers and the Ontario Farm Service Force to the extent of $50,000 for single accident and $100,000 for a multiple accident. It also covers doctor, hospitals, etc., up to $500.00 for a single case. These terms have been worked out in consultation with the Ontario Government Insurance Advisory Committee. By operating the above plan, the growers pay the full premium for the insurance. This premium this year will probably amount to $350.00 or $375.00.

4. Farm Commando Work:

This type of work seems to be gradually disappearing, but there is still some of it being done in Kent County in co-operation with the Kent County Federation of Agriculture which usually operates from June 15th to September 15th. So far this year we have had no definite report from them, but usually around 100 farmers are served and the number of days' work is in the neighbourhood of 5,000.

There is also a little work done in co-operation with the National Employment Service office and Department of Agriculture office in Stratford.

5. Ontario Farm Service Force Camps:

Starting in 1947 these Farm Service Force camps are now organized on a different basis from the war years. Our first move was to organize 14 Farm Labour Co-operatives which are made up of from 12 to 40 or 50 farmers each of whom hold two or more shares at $60.00 each in the Co-operative.

All of them are properly organized and have Charters to carry on the work. Under these Farm Labour Co-operatives and a number of Private Growers who have a business large enough to employ from 10 to 150 workers during the peak season, we had 13 Co-operative camps for girls which housed 1,170 girls during 1949 and eight Private camps for girls which housed 277 girls. We had four Co-operative camps for men and boys which housed 363 workers and we had seven Private camps for men and boys which housed 201. In addition to that, we placed in two of the above private camps 11 married couples during the peak harvest season.

Summary of camps:

17 Co-operative camps.
15 Private camps.
432 Farmers served through the camps.

Duration of camps:

1 ran for	6 months.
4	4½
3	4
8	3½
3	3
3	2½
2	2
3	1½
2	1

The total housing capacity of all of the camps at any one time is 1,729. 2,033 different workers were accommodated in the camps during 1949.

1949 was year of short crops in some places which reduced the demands. e.g. Huttonville in 1948 had a camp of 75 girls, in 1949 they never passed 35. Dixie in 1948 had 50, in 1949 13; Waterford in 1948 had 40, in 1949 15 to 20.

These workers were recruited from 35 high schools and continuation schools, 63 collegiates and technical schools, colleges and universities, eight private schools 14 places outside of Ontario including Quebec, Maritimes, Western Canada, the United States and France.

This service has eased the general labour situation in every district where we operated. 500 more could have been used this year if we had been able to secure them at the time they were needed.

Four of these Farm Labour Co-operatives operate two camps, one for the girls at the beginning of the season and the other for men and boys in the Fall season.

In the matter of construction of new camps there were 17 completed in 1948. During the season 1949 there were two completed, one at Vineland and the other at Stamford, in Niagara Township near Niagara Falls. The Government shared in the construction cost of the camp up to $50.00 for each worker accommodated in the camp. If the cost exceeded that amount the Co-operative carried the balance.

The Farm Labour Co-operatives are responsible for repairs, maintenance, improvements, landscaping, etc. They are also responsible for operating costs covering fuel, light, power, food, ice, laundry, sanitation, etc. To help meet these costs the board money is paid into their account.

The camp staff have been hired by the National Council Y.W.C.A., and the Government advances the money to pay their salaries. Camp mothers, directors and labour-secretaries are paid by the Government and cooks and camp assistants by the Farm Labour Co-operatives.

National Council Y.W.C.A.

We acknowledge herewith the great debt owed to the National Council Y.W.C.A. for the splendid service they have rendered the Ontario Farm Service Force Camps. They have been responsible for nutrition, housekeeping, discipline, recreation, health, etc. Without them we do not believe the camps can be successfully carried on. Their knowledge, experience and skill in this field of young women cannot be equalled by any other organization. We are also sure that the fact they are in the movement helps us to secure a superior type of woman for camp mothers and cooks, and in the type of camp mothers lies the success or failure of the camp work.

6. Western and Eastern Harvesters

Our placement officer in Ottawa again this year met the Harvesters at the station, collected their certificates, reticketed them to other points and notified Agricultural Representatives and Employment Service Managers of their allocation, and performed many other services of supervision up to the time that they were started off on their way home again.

When the Ontario Farm Service Force was organized in 1940 many of the features now connected with the movement were not in the picture at all. We spent three or four weeks trying to find some insurance plan that would cover

all our workers, but it was not until two or three years later that we first were able to secure group insurance that covered girls and boys on the way to their work in cars or trucks, on the farm during the work period and in cars or trucks on their way back to their point of origin. This principle has now been applied to all our camps and to our day-by-day service. How much money this has saved the Government is hard to measure. One girl in our first year, before we had this insurance cost us $675.00. One case at our West Toronto work last year cost the insurance company $500.00 for medical and hospital service.

Health Insurance

The Health Insurance Plan now in operation is paid for by a contribution from every boy and girl and staff member in the camp of 10c a week. This fund takes care of ordinary minor sicknesses and we find that this payment takes care of doctors and some hospital work, including X-rays. The fund now on hand is about $300.00 better off than it was last year at this time and there is between $1,200.00 and $1,300.00 in the Health Insurance Plan account.

Unemployment Insurance

During the first year or two of operation of our camps girls and boys had to pay their full board whether they were working or not. This produced hardships in many cases and at the suggestion of one our fruit growers there was instituted a fund that we called an Unemployment Insurance Fund. This fund guaranteed the workers a minimum week's wage of $9.60 or 32 hours work during each and every week before they would be liable for the payment of full board. If they received less than the above then a proportion of their board was paid out of the Unemployment Insurance Fund. While this plan so far as the fund is concerned is no longer in operation, the principle still is applied in that when a worker receives less than the above minimum they pay in board money proportionately less.

Recreation

Recognizing the importance of recreation for our workers there has been worked out in practically every camp some method for them to get to and from neighbouring towns and cities, swimming holes, picnic grounds, etc. In one case we were instrumental in having established a regular bus service from near the camp to a town about nine miles away.

The Farm Labour Co-operatives are becoming increasingly more active in their activities besides the housing of their help. Some of them have purchased baskets, boxes and other containers, oil, feed, agricultural machinery, etc. Two or three of them have spent large sums of money to improve their camp, put in hardwood floors and ceilings in their dining, and recreation rooms and are now using these buildings regularly as community centres for the work of their young people.

Health

Health supervision is organized under a properly qualified nurse who at the beginning of the season makes arrangements with the local doctor to be called in where their services are required and works out with them the method whereby their accounts are to be handled and how they are to deal with the boys and girls sent to them. The extent of the work done under this service may be seen by the following figures:

In 14 co-operative and nine Private Camps running in total 378 weeks the report is as follows:

Cases of illnesses and accident — 1,602.

Total days lost — 526½.

Doctors' visits — 290.

Hospitalized — 14.

Paid for by Co-operative insurance — seven.

Paid for by individuals — seven.

X-rays — four paid for by Co-operative and one by individual.

Board Account

It is interesting to note that only in two camps is there a definite deficit on food account and both of these are less than $75.00. In all other cases there is a credit balance running from $225.00 upwards.

STATISTICS AND PUBLICATIONS BRANCH

The Statistics and Publications Branch is charged with the responsibility of printing and distributing extension circulars, bulletins, and annual reports of the Department of Agriculture, and preparing statistics on farming operations in co-operation with the Agricultural Division of the Dominion Bureau of Statistics, Ottawa.

Agricultural statistics are prepared relating to all phases of the industry, principally by the use of mailed questionnaires. The Agricultural Representatives supply up-to-date monthly information on farming conditions in their respective localities, and a large body of farm correspondents provide monthly data on prices received for agricultural products at the farm and on the condition of crops and live stock. Very great attention was given by the staff of the Statistics and Publications Branch to the compilation and distribution of detailed statistics on agricultural operations during the year. Approximately 60,000 individual schedules were received from farmers, dairies, creameries, cheese factories, and processing plants, as a basis for the preparation of estimates on farm production. The rural school teachers of Ontario provided excellent co-operation in distributing and returning cards for both the June and December Survey of crops and live stock.

Weekly, monthly, and annual statistics are prepared relating to the many different phases of agricultural activity and the published information provides opportunity for studying the changing trends in farming conditions. Much of the statistical data has been prepared continuously for a considerable number of years, with some series of information, such as crop acreages, live stock numbers, and annual value crops and live stock, dating back to 1882. Other data relating to the production and marketing of farm products, such as the production of fruit and vegetable crops, production of dairy products, and the sale of fluid milk and cream, have been inaugurated more recently.

For the convenience of the public, statistical data is grouped together and published promptly in the following Reports, which are distributed to any interested person free of charge:

The Monthly Crop Report containing the latest available information on field crop and live stock production, current prices received by farmers for agricultural products, weather data, and other pertinent and timely information.

The Monthly Dairy Report containing statistics covering the entire field of milk production — manufacture, distribution, stocks and prices. The record of purchases and sales of fluid milk given in this Report has been useful in permitting analysis to be made of this important branch of the dairy industry.

The Seasonal Fruit and Vegetable Report giving a great deal of detailed material on these crops is prepared by the Ontario Fruit and Vegetable Statistics Committee, which is composed of both Dominion and Provincial Government officials.

The Annual Statistics Report shows, by county division, the acreage, production and value of field crops; the number and value of each class of live stock; the number and amount of chattel mortgages outstanding; detailed weather information; and has a valuable yearly summary of statistics from 1882 to date.

Over 600,000 publications dealing with agricultural subjects were published during the current fiscal year, together with 175,000 copies of the statistical Reports mentioned above.

A list of available publications may be obtained by writing to the Statistics and Publications Branch, Ontario Department of Agriculture, Toronto. Supplies of pamphlets are also kept on hand for local distribution by the County and District Agricultural Representatives, Agricultural Colleges, and Experimental Institutions, functioning under the Ontario Department of Agriculture.

During the fiscal year 1949, the following literature was printed:

ANNUAL REPORTS

	No. of Copies
The Report of the Minister of Agriculture	1,650
Agricultural Societies	3,300
Entomological Society	2,000
Horticultural Experiment Station, Vineland Station (1947-48)	10,600
Horticultural Societies	3,300
Ontario Agricultural College and Experimental Farm	3,000
Ontario Crop Improvement Association	15,000
Ontario Veterinary College	2,000
Stallion Enrolment Board	2,400
Statistics Report for 1948	3,000

BULLETINS

Serial No.		
370	Testing Milk, Cream and Dairy By-Products	5,000
409	Weeds of Ontario	20,000
414	Capons and How to Caponize	2,000
429	Bee Diseases and Pests of the Apiary	10,000
452	Harvesting and Storing of Ear Corn	10,000
455	Emergency Hay and Pasture Crops for Ontario	15,000
463	Soil Management and Fertilizer Use	25,000
466	Salads the Year Round	20,000
467	Frozen Foods	80,000
468	Canning Ontario's Fruits and Vegetables	30,000
469	Better Ontario Pastures	30,000
470	Your Money's Worth in Food	20,000
471	Rural Sewage Disposal	20,000
472	Table Turnips (Rutabagas)	10,000
473	Raspbery and Blackberry Culture	15,000
474	The Soybean as a Grain Crop in Ontario	10,000
475	Small Fruits for the Home Garden	10,000

EXTENSION CIRCULARS

Serial No.		
75	Chemical Weed Control	10,000
75A	Municipal Weed Control	5,000
76	Spraying Corn	5,000
77	The Delectable Canadian Rutabaga (Recipes)	10,000
78	Guide to Culling Hens	100,000
79	Good School Lunches	30,000
	The Art of Pruning	5,000
	The Earth Answers Back	30,000
	Soil Survey of Grenville County	3,000
	Vegetable Garden Requirements	20,000
	Weed Control Act	2,500

WOMEN'S INSTITUTE BRANCH AND HOME ECONOMICS SERVICE

GENERAL

Membership

Number of Senior Women's Institutes in Ontario, March 31, 1950	1,368
Number of Junior Women's Institutes in Ontario, March 31, 1950	81
Total number of Women's Institutes in Ontario, March 31, 1950	1,449
Membership, March 31, 1950	47,250
Institutes Organized during the year	51
Institutes Re-organized during the year	4
Institutes Disbanded during the year	1

Of the Institutes organized 15 were Junior and 36 were Senior.

Three Junior Institutes changed to Senior Institutes.

The newly-organized Institutes were:

Brant North	—Tranquility
Bruce East	—Brucedale
Dufferin South	—Hockley Valley
Dundas	—Colquhoun
Durham East	—Hope Township Junior
Grey Centre	—Blantyre, Proton Junior
Grey North	—Briar Hill, Owen Sound Junior
Haldimand West	—Garnet
Halton	—Brookville Junior
Hastings East	—Foxboro
Hastings North	—Hungerford Junior
Kent East	—Clachan Junior
Lambton Centre	—Brooke Junior, Froomfield
Lambton North	—Euphemia Junior, Oakdale
Lambton South	—Plympton Township Junior, Sarnia Township Junior
Leeds	—Seeley's Bay
Lincoln	—Grace Community
Middlesex East	—Wellburn
Middlesex West	—Glencoe Junior
Ontario North	—Atherley
Oxford North	—East Nissouri (Kintore) Junior
Perth North	—Donegal, Listowel Junior, Mount Pleasant, Wallace Goodwill
Peterborough	—Brookdale, Selwyn
Renfrew North	—Mackey
Renfrew South	—Stewartville
Simcoe Centre	—Silver Maple
Simcoe East	—Warminster
Wellington North	—Beehive
Algoma North Shore	—Echo Valley
Cochrane North	—Hunta
Kenora	—Camp Robinson, Ear Falls
Muskoka North	—Hekkla
Nipissing	—Chisholm Junior, Calvin-Bonfield Junior
Parry Sound South	—Maple Island
Sudbury	—Naughton, Chelmsford, North Star
Thunder Bay	—Red Rock, The McGregor, Macdiarmid

Institutes which re-organized were:

Kent East	—Palmyra
Renfrew North	—Lake Dore
Parry Sound South	—Sundridge
Sudbury	—Westree

Institutes which disbanded were:

Lambton North	—Watford

Institutes becoming Senior Institutes were:

Kent East	—Rural Ridgetown Junior
Ontario South	—Brechin
Welland	—Bowen Road Junior

District Annual Meetings and Conventions

In May and June 1949 annual meetings were held in 100 districts with representatives from 1,378 Institutes (95.1%) and a total attendance of 11,458. Nine new districts were established as a result of the re-division of districts and subdivisions (one in 1948, eight in 1949).

Thirteen area conventions were held in the fall of 1949 with an attendance of 5,300. One new area was established (Lambton, Essex and Kent); one area enlarged (Manitoulin, Sudbury and Algoma) and the Manitoulin Convention was changed to a Manitoulin conference.

The Women's Institute Branch and Home Economics Service was represented at all annual meetings and at all conventions.

Legislative Grants

To districts $4,142.50; to Institutes $2,166.00; to convention areas $265.00; total $6,573.50.

Literature Printed

	Number of copies
Ontario Standing Committees and Their Function	12,000
Being Well Dressed and Well Groomed	8,194
Branch Minute Books	1,000
District Minute Books	168
How Many Vegetables Did You Eat Today?	3,000
County Honour Certificates	2,000
Provincial Honour Certificates	500
Home Table Service and Table Manners	8,000
Fun With Flowers	1,500
The Club Girl Entertains	9,000
Cottons May Be Smart	9,000
Annual Statement of Institute	1,600
Report of Meeting Forms	3,600
Fall and Winter Home and Country	48,000
Co-operative Programme	9,000
Co-operative Programme Application Forms	3,300
Let's Cook It Right	5,000
Oven Meals	5,000

Literature Mimeographed

	Number of copies
Song Sheets	500
Kitchen Plans	1,000
Slip Covers	470
Frozen Foods	1,000

Oven Meals	2,200
Let's Cook It Right	1,550
School Lunch	50
Children's Food	200
Canada Food Rules	2,600
Loan Library	300
Clothing Instruction Sheets	4,400
Smocking	900
Psychology	520
Sleeping Garments	1,750
Gardens	6,800
Food Selection Score Card	1,060
Menus	610
Club Girl Stands on Guard	1,250
Supper Club	500
Skit	1,000
Bias Binding	2,500
Meat in the Menu	750
Clothes Closets	1,200

FEDERATED WOMEN'S INSTITUTES OF ONTARIO

The Provincial Board held two meetings, one at the Royal York Hotel November 1949 and the other at the Ontario Agricultural College, Guelph, in May. Mrs. Futcher was re-elected provincial president and Mrs. J. H. McCulloch re-appointed provincial secretary-treasurer.

The Treasurer's annual statement showed receipts $26,270.39, total expenditures $14,138.58, leaving a balance on hand in general funds $7,957.96 and in the Ontario Women's Institute Scholarship Fund $4,187.53 plus two $50.00 Victory Bonds ($4,287.53).

Provincial Women's Institute Conferences were successfully initiated in May 1949 when delegates from the areas, districts and branches came together at the Ontario Agricultural College, Guelph, for discussion of current problems and the pooling of ideas for future activities.

A Summer Holiday for members was held the second week in July.

To encourage Junior Homemaking Club Work an Ontario Women's Institute Scholarship Fund for Junior Institutes and Homemaking Club girls was established. A goal of $25,000.00 has been set for this. These scholarships will give the girls the privilege of taking a short course in the subject of their choice at University or Agricultural Centres.

To take care of the rising costs of administration the annual membership fee was raised from 25 to 50 cents.

The number of provincial board directors has been increased from 22 to 29 directors.

Affiliations

The Federated Women's Institutes of Ontario are constituent members of the Federated Women's Institutes of Canada and the Associated Country Women of the World. They are affiliated with the Ontario Federation of Agriculture.

Letter Friends

To establish closer bonds of friendship and understanding between Ontario Women's Institutes and other constituent groups of the Associated Country

Women of the World the following new letter friends were contacted: England 20, Scotland 16, Australia 9, Holland 9, Sweden 4, United States 4.

Friendship Links

A scheme, started as a result of a need felt since the war, has been continued by Ontario Women's Institutes. This year 82 Friendship Links were established.

Visitors to Ontario Institutes

Several Women's Institute members from the British Isles have been entertained in the homes of our women and have attended branch, district and convention area meetings.

Ontario County Farm Improvement

At the Ontario County Farm Improvement and Soil Conservation Day, September 18, the Women's Institute Branch assisted in drawing up plans for re-modelling the farm home and completing the kitchen. This project was viewed by approximately 8,000 people and 5,000 brochures on Kitchen Planning were distributed.

THE CO-OPERATIVE PROGRAMME IN HOME ECONOMICS

In planning the Co-operative Programme in Home Economics special emphasis was placed on the needs of the young matron.

Through our programme we aim:

1. To help women acquire sound and approved practices for greater home efficiency.
2. To discover, stimulate and train leadership.
3. To develop a more abundant life in our rural communities and a deeper appreciation of the things near at hand.
4. To develop better, happier and more useful citizens.

Our Women's Institutes of Ontario are deeply interested in the maintenance and betterment of home life, fully realizing that "A nation cannot rise above the level of its homes."

Through our Co-operative Programme it is our aim to provide the women of Ontario with the type of Homemaking education which they most desire and which will be most helpful to them.

District Services included: One day conferences in Care of Clothing, Personality and Dress, Administrative Leadership; one-half day conferences in You and Your Citizenship, Developing Community Enterprises, Health Education, Household Accounting; two day training schools in Salads the Year Round; and five day training schools in Refinishing Your Furniture and Tailored Slip Covers.

Short Courses were offered to Branch Institutes as follows: Making Clothes for Children, Modern Dressmaking, Home Care of the Sick, Small Loom Weaving, Braided Rugs, Hooked Rugs, Leather Purse Construction, Methods of Decorating Leather, five whole days; Leather Glove Making, Needlepoint, three successive whole days; Leather Slippers, Stuffed Toys, Smocking, Knitting, two successive whole days; Lingerie, five successive afternoons; Your Pre-School Child, How Your Elementary School Child Develops, Understanding Your Teen-ager, Living Together in the Family, four successive afternoons; The Time-Saving Kitchen,

three consecutive afternoons; Your Children's Food, Let's Cook it Right, The School Lunch in Your Community, Your Money's Worth in Food, Oven Meals, Quilts and Quilting, Furnishings of the Living Room, two consecutive afternoons; Canning Ontario's Foods, Frozen Foods, one afternoon *or* one evening.

WOMEN'S INSTITUTE BRANCH AND HOME ECONOMICS SERVICE

Staff Conferences

One Junior conference was held in June. Two Senior conferences were held in the spring to discuss the Co-operative Programme for 1950-51 and to plan for district annual meetings. A full staff conference was held in December.

Radio Programmes

With the assistance of farm commentators over CBL, CFRB and other stations several radio interviews were given pertaining to the work of our Branch and the Federated Women's Institutes of Ontario.

Rural Night Schools

In co-operation with the Agricultural Representatives Branch, Department of Agriculture and the Community Programmes Branch of the Department of Education, Rural Night Schools were conducted. Under the direction of the Women's Institute Branch and Home Economics Service 25 Rural Night Classes were held in 13 centres with a total enrolment of 234 women and girls. To train local instructors for these courses a Refresher Course was conducted by Women's Institute Branch staff members at Toronto. Courses in Refinishing of Furniture, Foods and Clothing were offered.

Special Course in Simcoe North

In co-operation with the Agricultural Representative of North Simcoe, the Women's Institute Branch and Home Economics Service provided special courses in five different centres on consecutive days of the week for a duration of six weeks. Three hundred and seventy-nine women were on the roll with an average attendance of 237 at a total of 38 meetings.

DISTRICT PROGRAMME

Topic	*Districts Served*	*Meetings Held*	*Institutes Represented*	*Enrolment*
Care of Clothing	1	3	6	40
Personality and Dress	21	49	219	1,737
Household Accounting	7	19	80	492
You and Your Citizenship	—	—	—	—
Developing Community Enterprises	11	22	96	706
Health Before and After Forty	26	70	255	2,593
What to do Until the Doctor Comes	5	15	64	559
Modern Medicines and Their Uses	2	4	11	119
Home Furnishings	6	46	48	94
Salads the Year Round	1	4	7	28
Administrative Leadership	30	42	282	1,080

INSTITUTE SERVICES

Short Courses

Topic	*No. of Courses*	*Enrolment*	*Average Attendance*
Making Clothes for Children	6	66	8
Modern Dressmaking	43	454	10
Lingerie	2	20	9
Your Children's Food	2	94	24
Let's Cook It Right	22	1,190	27
Canning Ontario's Foods	49	1,328	27
The School Lunch in the Community	6	196	16
Your Money's Worth in Food	23	1,086	25
Oven Meals	38	1,666	22
Frozen Foods	49	1,409	28
Quilts and Quilting	14	240	17
Leather Gloves	17	184	10
Knitting	1	18	18
Hooked Rugs	4	37	9
Braided Rugs	—	—	—
Smocking	20	281	13
Leather Slippers	6	70	12
Needlepoint	8	87	10
Leather Purse Construction	3	29	9
Decoration of Leather	1	9	8
Weaving	3	332	11
Home Care of the Sick	14	228	16
The Furnishings of the Living Room	12	281	19
The Time-Saving Kitchen	12	311	19
Your Pre-School Child	2	30	8
How Your Elementary School Child Develops	1	14	10
Understanding Your Teen-Ager	8	155	12
Living Together in the Family	13	265	12

LOAN LIBRARY

Number of folders sent to Institutes	9,971
Number of Women's Institutes served	1,550
Number of letters with loans	1,550

To assist members in the preparation of programmes 9,971 folders were sent out on loan for a two-week period. The following classification indicates the interests of the Institutes: Home Economics and Health 2,399; Miscellaneous 1,876; Citizenship and Education 1,719; Community Activities and Public Relations 1,472; Agriculture and Canadian Industries 1,053; Women's Institute 769; Historical Research and Current Events 668; Resolutions 8.

JUNIOR EXTENSION PROGRAMME IN HOME ECONOMICS

Homemaking Clubs

The Homemaking Club programme for girls and young women, twelve to twenty-six years of age is planned to give training in home economics, to provide an opportunity for continuous growth and development through participation in educational programmes, to encourage satisfaction in achievement and appreciation of rural living, to develop leaders and to promote intelligent responsible citizenship.

The sixteen County or District Home Economists direct the Homemaking Club programme in their respective districts. They conduct Local Leader Train-

ing Schools for leaders, visit Clubs and in co-operation with leaders and members hold District or County Achievement Days.

Units	*Training Schools for Leaders*	*No. of Clubs*	*No. of Members*	*Records of Achievement*
Food and Nutrition Clubs	27	134	905	717
Clothing Clubs	42	199	1,177	903
House Furnishing Clubs	12	73	536	451
Hospitality Clubs	19	95	801	593
Girls' Home Garden Clubs	53	267	1,950	1,406
Defence Clubs	12	72	479	408
Total	165	840	5,748	4,478

Over eight hundred club members took part in Junior Days at five Class A and fourteen Class B Fairs. They judged, gave reasons, demonstrated and placed club exhibits.

Junior Days were held at Central Canada, Peterboro, Canadian National Exhibition and Western Fair. Club members attending Central Canada Exhibition enjoyed a three day club camp with special programme, while members at the Canadian National Exhibition were given accommodation at a University Women's residence for one night. These days afford members experience and training and an opportunity for fellowship with club members from many counites. Inter-county demonstrations and inter-county club exhibits were special features.

Similar Junior days were held at Belleville, Stratford, Simcoe, Teeswater, Erin and Owen Sound with over three hundred and fifty club members judging, presenting forty-two club demonstrations and placing fifty club exhibits.

Some eighty club exhibits selected at County Achievement Days were set up at nine other Class B Fairs.

Garden Club members displayed vegetables and flowers from Club gardens at many local fairs throughout the province.

Leadership was given Juniors (Homemaking Clubs and Junior Institutes) for special programmes depicting club activities at various Class B Fairs.

A Provincial Day to select a Clothing Team and a Food Team to represent Ontario at the National Contest sponsored by the Canadian Council on Boys' and Girls' Club Work was held at Macdonald Institute with thirteen counties sending Clothing Teams and six counties Food Teams. A Food Team was selected from Carleton County and a Clothing Team from Elgin County.

Provincial Honour pins and certificates were awarded in 1949 to forty-two members who had completed twelve Homemaking Club Units.

Girls' Garden Clubs

Nineteen hundred and fifty gardeners carried on the programme outlined for the Girls' Home Garden Club. These clubs were organized in fifty-three counties and districts under the supervision of Agricultural Representatives and Home Economists. Reports indicate 90% of gardens in production and 72.1% of gardeners completing every phase of the programme.

Junior Institutes

Junior Institutes, Farm Girls' Clubs and rural young women associated with Junior Farmers' Association continued to co-operate with Women's Insti-

tutes and Junior Farmers in planning and carrying on programmes concerned with home and family life, agriculture, community and citizenship. They gave leadership in sponsoring Homemaking Clubs and with Junior Farmers held Field Days, Sunday Services, Amateur Entertainments, Public Speaking Courses, Choral Classes, Farm and Home Safety projects and a Provincial Camp. They attended regional Junior Farmers' Association Conference at Kemptville Agricultural School, Haileybury and Fort William and the Annual Conference at Ontario Agricultural College, Guelph.

Officers of Junior Institutes and Junior Farmers attended Officer Training Schools in Peterborough, Simcoe, Camilla and Ridgetown. These Schools were conducted as Workshops in Programme Planning.

Special Undertakings

Juniors continued to contribute to various causes such as Unitarian Service Committee and Save the Children Fund. They maintained their correspondence with Juniors in other lands. Everywhere they extended a welcome to people from other lands in their communities. These new-comers became active members of some Homemaking Clubs and Junior Institutes.

Community Nutrition Course

The Women's Institute Branch and Home Economics Service co-operated with the Canadian Dietetic Association in the organization and administration of a post-graduate course in Community Nutrition. Each of three home economics graduates, who had been granted bursaries provided by the Canadian Life Insurance Officers' Association spent six weeks with the Women's Institute Branch and Home Economics Service as part of her nine-month course.

Co-operation with Other Organizations

Our Branch wishes to acknowledge the assistance given so generously by other Branches of the Department, especially the Agricultural Representatives Branch, the Ontario Agricultural College and the Kemptville Agricultural School.

The staff of the Women's Institute Branch and Home Economics Service co-operated with such organizations as the Women's Division of the Ontario Agricultural Societies, the Junior Farmers' Association, the Federation of Agriculture, The Canadian Council on Boys' and Girls' Work, the Canadian Red Cross Society, the Canadian Association of Consumers, the Canadian Society for the Control of Cancer, The Health League of Canada, The Canadian Association for Adult Education, The Canadian Radio Council, The Children's Film Library.

OUTLOOK

Working with the rural women and girls of this province through Senior and Junior Women's Institutes, Homemaking Clubs and other groups, the Women's Institute Branch and Home Economics Service aim to maintain high standards for home and family life. This covers a wide field since our home and family life influences and is influenced by conditions in our community, our country and the world. Our horizons have broadened and our responsibilities have increased.

In meeting the challenge of the day our women are ready for constructive action. Membership in the Federated Women's Institute of Ontario is higher than ever before recorded and members in Junior Institutes and Homemaking Clubs are correspondingly high.

Nevertheless there are still sections of the province not reached by Institute work and in other sections where groups already are established many in the community do not receive the benefits offered. This is a challenge to our members and our extension workers. If we are to maintain high standards of home and family life in our rural communities and accept our responsibilities in the world community then every family in the community must be encouraged to work toward this goal.

(1) A county home economist in each county, this home economist to be responsible for home economics extension in both senior and junior work in her county.

(2) An additional service in Home Furnishings to give individual assistance to rural families wishing to remodel their homes.

(3) Courses in Home Management to include economics of the household, conservation in the home, the purchase and use of electrical equipment, etc.

(4) Home economics extension by radio.

(5) Additional bulletin service.

PROVINCIAL ENTOMOLOGIST

The work of the Provincial Entomologist for 1949 and 1950 was carried out in co-operation with the Department of Entomology, O.A.C. and W. C. Allan of that department assisting.

TEACHING AND RESEARCH

Considerable time was spent in teaching in the Department of Entomology and in directing and assisting with certain research work in the applied field.

EXTENSION

A greater proportion of time was spent on extension work than in previous years. Serious outbreaks of several pests in 1949 made this necessary. The spray service was continued, press and radio bulletins on insect control were prepared and the reports on insects for the Seasonal Fruit and Vegetable Report and the Monthly Crop Report were prepared. Insect sections in several bulletins were revised.

REGULATORY DUTIES

The Provincial Entomologist under the Director of the Ontario Fruit Branch was in charge of certain "plant diseases" under the Plant Diseases Act.

EUROPEAN CORN BORER

Fourteen counties and three townships in one other county continued under the corn borer regulations. Waterloo and Wentworth counties and part of Middlesex discontinued inspection in 1949. Thirty-two county and township inspectors were appointed in the spring of 1949. Corn refuse was well cleaned up in these counties. A fall survey was conducted in 1949 by V. Shannon and L. McMullen, 3rd year O.A.C. students. This survey indicated that there was no difference in fall injury from corn borer in counties continuing compulsory clean up. As a result, in January 1950, county councils were advised to discontinue inspection.

NURSERY INSPECTION

One hundred and one nurseries were registered by the Ontario Fruit Branch. Four inspectors spent approximately three months in carefully inspecting these for San Jose scale and pear blight according to regulations under the Plant Diseases Act. San Jose scale was more prevalent than in recent years. Out of a total of 3,267,891 stock inspected, 1,625 infested with San Jose scale and 24 infested with pear blight were destroyed. No other pests of major importance were encountered. European pine shoot moth and tranished plant bug caused more damage than usual.

NURSERY STOCK FUMIGATION

A small amount of nursery stock for Nova Scotia was fumigated.

SUGAR BEET NEMATODE

C. Rose of the Ontario Fruit Branch was stationed in the sugar beet area in the fall of 1949 to record infestations of sugar beet nematode. None were found at either Jeanette's Creek or at Glencoe, areas where they had been found in 1948 and in 1931 respectively. Infestations were found in the Blackwell area but, except on a few farms and in small areas on these farms, there was no visible crop damage. Regulations on the movement of sugar beets from Blackwell were not enforced.

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1949

ONTARIO

Printed by Order of

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Report of THE ONTARIO VETERINARY COLLEGE

To The Honourable T. L. Kennedy,
Minister of Agriculture

Sir:

I have the honour of presenting, herewith, the report of the Ontario Veterinary College for the year extending from April 1, 1949 to March 31, 1950.

The activities during the past year have been widely varied. Of special interest was the ceremony held on April 22 at which a portrait of the late Professor H. E. Batt was presented to the College by Year '38, a portrait of the late Dr. Andrew Smith, founder of the College, was presented by Year '23, and a landscape painting was presented by Year '47. In addition, the Ontario Veterinary Association presented an illuminated address to the Honourable Minister, in gratitude for the assistance which he has rendered to the veterinary profession. Later in the evening, three artists from the Toronto Conservatory of Music presented a most enjoyable musical programme.

On July 21 and 22, a representative group of veterinarians met at the Ontario Veterinary College to take part in a short refresher course and attend a meeting of the Ontario Veterinary Association. The course included both small and large animal clinical sessions. Papers were presented on such subjects as canine hepatitis, mastitis, Listerella infection, and breeding problems.

The number of students enrolled at the College in September, 1949, was 433, sixty-two per cent of whom were war veterans. At the present time, the faculty of the College consists of 31 permanent, four temporary, and seven part-time members. The staff, including the secretarial, housekeeping, and infirmary personnel, is made up of 47 permanent, 11 temporary, and seven casual help.

The arrangement of the various departments of the College remained the same as during the previous year. However, the scheduled realignment of the Extension and Clinical Departments is now underway.

ACADEMIC STAFF

Dr. Lionel Stevenson, registrar and assistant principal, retired in September, after 23 years in the veterinary profession and 37 years of service to the agricultural industry as a whole.

Several additions have been made to the academic staff. Dr. J. Archibald was appointed to the staff of the Department of Small Domestic and Fur-bearing Animals; Dr. C. G. Wills joined the staff of the Department of Preventive Medicine and Hygiene; and Mr. B. M. McCraw, M.A., was appointed to the Department of Parasitology.

Several members of our faculty have been engaged in post-graduate studies. Those on leave of absence for this purpose were Dr. H. G. Downie, who is taking post-graduate work in physiology at Cornell University, and Dr. J. D. Schroder,

who is engaged in studies in the pathological field at the Mayo Foundation, Rochester, Minnesota. Dr. E. F. Pallister has continued his studies in surgery under Dr. James Farquharson, at Colorado State College, Fort Collins, Colorado.

Dr. D. A. Barnum, who was on leave of absence while taking the course in Public Health and Hygiene at the School of Hygiene, University of Toronto, completed the course and received the Diploma in Veterinary Public Health. Dr. J. A. McGregor was granted leave of absence in order that he might pursue the same course of study at the School of Hygiene.

In May, Dr. J. A. Henderson returned from a visit of seven months' duration to the South American countries of Uruguay, Paraguay, and Argentina, where he studied disease problems of cattle.

THE UNDERGRADUATE COURSE

In September, the first class to enrol for the new five year course in veterinary medicine was registered. The prescribed course of study now extends over five academic years at the Ontario Veterinary College with a four-month period of regulated internship to be taken in the interim between the fourth and fifth years.

Students who registered prior to September last continued in the four year undergraduate course.

ADMISSION REQUIREMENTS

Certain minor changes have been made in the requirements for entrance to the College. These changes are designed to accommodate students who are completing their pre-veterinary course of studies in Grade XIII at the various collegiate institutes.

CURRICULUM

The five year course has an advantage over the four year course in that it gives the student a more complete grounding in the basic sciences and also in the clinical subjects. The first year of the course includes introductory courses in the basic sciences and in the husbandries. When realignment of the curriculum has been completed, the fifth year will be devoted mainly to clinical subjects—clinics in large and small animals and poultry, and clinical microscopy and pathology—so that the young graduate will be equipped with a more practical knowledge when he goes forth to practise his profession.

EXTENSION SERVICES

The marked increase in the number of specimens submitted and also in the demand for consultation, both in the field and at the College, has been most encouraging. Following is a summary of the various activities in the diagnostic services offered through the Extension Department of the College.

MASTITIS

The total number of milk samples submitted for examination for the presence of mastitis infection was 16,061. Of this number, 5,325 samples were secured by members of the Ontario Veterinary College staff from herds under special study. A comparative study was conducted, to determine the efficacy of various antibiotics—penicillin, streptomycin, bacitracin, and aureomycin—in the treatment of mastitis infection. In 29 instances where other methods of control failed to bring forth the desired results, autogenous vaccines were prepared and distributed.

BRUCELLOSIS

In all, 69,683 samples of bovine blood were received and examined for the presence of the *Brucella abortus* organism. Tests were conducted on 24,462 samples of blood withdrawn from cattle intended for export or for show purposes.

In the calfhood vaccination programme, 174,102 doses of Strain 19 *Brucella abortus* vaccine were issued during the fiscal year, and 140,768 calves were vaccinated. Two hundred and eighty veterinarians participated in the vaccination plan.

During the year, testing was conducted on cattle in the Bruce Peninsula to determine the incidence of Bang's disease on an area basis. This is to be followed by an area calfhood vaccination programme with a view toward the complete eradication of the disease.

KEMPTVILLE REGIONAL LABORATORY UNIT

Of particular interest is the development of the regional laboratory unit at Kemptville, Ontario. Dr. J. R. Gallagher has co-operated with the various agricultural representatives in calfhood vaccination programmes in the eastern Ontario counties of Prince Edward, Hastings, Renfrew, Grenville, and Dundas.

TEST FOR PARENTAGE

Tests for proof of parentage have been undertaken by members of the haematological laboratory staff. Considering the intricacy of the test procedure, the staff of the laboratory have rendered an excellent service to cattle breeders.

This test has been applied in the following instances:

(a) When a breed organization has reason to question the parentage of a certain animal, blood samples from the supposed sire or sires, the dam, and the offspring are taken. The offspring's parentage may be determined since we know that its blood contains certain factors present in the blood of both the dam and the sire.

(b) When twin calves, one a male and the other a female, are born, and if the blood types of the two are identical, the female will be a free-martin or non-breeder.

(c) In artificial insemination units, permanent records of the blood types of all sires are maintained.

POULTRY DISEASES

The poultry diseases laboratory received 1,952 consignments of birds, comprising a total of 4,718 specimens.

In addition to the diagnostic work conducted, the following biological products were distributed for immunization purposes: fowl pox vaccine—241,500 doses; pigeon pox vaccine—11,100 doses; and laryngotracheitis vaccine—84,500 doses.

In co-operation with the Connaught Medical Research Laboratories, investigational work was conducted in connection with immunization against laryngotracheitis and chronic infectious bronchitis.

Thirty-five visits were made to farms for purposes of treatment and investigation. Twenty-one meetings were attended and six radio broadcasts made. Twenty pamphlets on poultry diseases were prepared for distribution.

SMALL DOMESTIC ANIMALS

During the year, 1,700 dogs and cats were received for medicinal and surgical treatment.

FUR-BEARING ANIMALS

Our staff in this section of the Small Domestic and Fur-bearing Animals Department rendered the following services to the fur industry: 896 autopsies on fur-bearing animals; examination and treatment of 438 living animals; 452 complete blood examinations on experimental animals; 508 tissue sections from mink, foxes and chinchilla examined for evidence of pathological change; 35 blood sugar examinations on experimental animals; 86 examinations of a bacteriological nature; 172 x-ray examinations on experimental and diseased fur-bearing animals; examination of 102 tissue smears for the presence of inclusion bodies; and 57 examinations of food to determine its suitability for fur-bearing animals.

In addition to the diagnostic work, 61 consultations were given to ranchers seeking information relative to the raising of fur-bearing animals. Numerous letters, giving advice on fur industry problems were sent to fur farmers and veterinarians. Nine articles were published in veterinary journals and fur magazines.

The following products were distributed to veterinarians for use in connection with a disease prevention programme amongst fur-bearing animals; 1,150 cc. of autogenous bacterin and 11,250 doses of tissue vaccine.

Work was continued on the problem of distemper infection affecting dogs and fur-bearing animals. Experimental work was also conducted on cystic calculi in mink, Shigella infection in foxes, and fur-chewing and slobbers in chinchilla.

LARGE ANIMALS

During the past fiscal year, 837 cases, including 259 horses, 272 cattle, 434 swine, 49 sheep, and 185 field consultation cases, were treated by members of the clinical staff. Three hundred and sixty-two cadavers (six horses, 77 cattle, 246 swine, and 33 sheep) were submitted for post-mortem examination.

RESEARCH

Studies have been made on various diseases of livestock and poultry. Several of these have been mentioned previously in this report. In all, 30 projects were undertaken, four of which can be listed as major projects, as follows: (1) infectious granular vaginitis of cattle; (2) enterohepatitis infection (blackhead) of turkeys; (3) chronic infectious bronchitis of poultry; (4) a study of (a) various antibiotics in mastitis therapy, and (b) the value of aureomycin in the treatment of certain conditions.

Laboratory studies and field investigation on infectious granular vaginitis of cattle have brought forth interesting results. An organism which has been described as the 'H germ' has been isolated with great frequency from cattle infected with granular vaginitis. The transmissibility or infectious nature of this organism has been observed. Studies are being continued and further details will be available in the immediate future.

In connection with the research work on enterohepatitis infection (blackhead) of turkeys, the Ontario Veterinary College obtained quantities of "Enheptin T" from Lederle Laboratories, Pearl River, New York. Preliminary trials using

"Enheptin T" indicated that this new preparation has an effective prophylactic action against enterohepatitis infection. Details of this work, which was under the direction of Dr. A. A. Kingscote, head of the Department of Parasitology, have been published by Dr. J. K. McGregor.

Chronic infectious bronchitis has only recently been detected in Ontario. In the study of this disease, the blood of poultry was examined for the presence of neutralizing bodies, which indicate past and present bronchitis infection. Vaccines have been used experimentally to a limited extent, in the control of this type of infection.

Also of importance have been the field investigation of the incidence of liver fluke infestation in various communities of Ontario, and the testing of vaccines for prophylactic treatment of laryngotracheitis of poultry. The search for an agent which would effectively control infectious rhinitis of swine has been continued.

In April, a 46-acre parcel of land near Guelph, known as the Gale Farm, was purchased to be used as an experimental station on which to conduct research projects under field conditions. Blackhead infection of turkeys and breeding deficiency conditions of cattle were among the projects carried on at this station.

GENERAL

Members of the College faculty addressed meetings of Federation of Agriculture groups and presented lectures at short courses in various counties. Faculty members also addressed scientific gatherings and meetings of breed organizations.

I should like to thank my faculty colleagues and all members of the Ontario Veterinary College staff for their hearty assistance and co-operation. They have worked most diligently and have given unsparingly of their time and energy. I also wish to express my gratitude to you, as Minister of the Department of Agriculture for Ontario, and to the Deputy Minister, for the kind and sympathetic consideration shown during the past year.

All of which is respectfully submitted.

A. L. MacNABB,
Principal.

Guelph, Ontario, March 31, 1950.

SUMMARY OF FINAL EXAMINATIONS — 1949-1950

ONTARIO VETERINARY COLLEGE

Number of students 413

STANDING ATTAINED	1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	ENTIRE COLLEGE
1st Class Honours	17 (21.25)	9 (9.57)	27 (23.89)	24 (19.05)	77 (18.64)
2nd Class Honours	33 (41.25)	52 (55.32)	82 (72.57)	95 (75.40)	262 (63.44)
Pass Standing	2 (2.50)	20 (21.28)	....	5 (3.97)	27 (6.54)
Cond. with 1 supp.	18 (22.50)	5 (5.32)	4 (3.54)	1 (.79)	28 (6.78)
Cond. with 2 supps.	4 (5.00)	....	....	1 (.79)	5 (1.21)
Failures	6 (7.50)	7 (7.45)	....	....	13 (3.15)
Aegrotats	....	1 (1.06)	....	....	1 (.24)
Total	80 (100.00)	94 (100.00)	113 (100.00)	126 (100.00)	413 (100.00)

SCHOOL AVERAGES BY SUBJECTS

SUBJECT	1ST YEAR (Five Year Course)	2ND YEAR	3RD YEAR	4TH YEAR	SCHOOL AVERAGE
Anatomy	....	68.39	....	....	68.39
Animal Husbandry	73.07	....	....	....	73.07
Animals in Nature	77.84	....	....	....	77.84
Animal Reproduction	....	....	....	71.23	71.23
Bacteriology	....	....	68.66	67.87	68.26
Botany	69.13	....	....	....	69.13
Business Practice and Jurisprudence	....	....	....	70.63	70.63
Biochemistry	....	74.20	....	....	74.20
Clinical Chemistry	....	64.91	....	....	64.91
Chemistry (Inorganic)	71.09	....	....	....	71.09
Chemistry (Organic)	70.70	....	....	....	70.70
Diseases of Fur-Bearing Animals	....	....	72.00	....	72.00
Diseases of Horses	....	....	71.35	76.45	73.90
Diseases of Poultry	....	....	71.13	....	71.13
Diseases of Ruminants	....	....	74.35	72.79	73.57
Diseases of Small Animals	....	....	79.19	79.95	79.57
Diseases of Sheep and Swine	....	....	78.86	....	78.86
Economics	64.50	....	....	....	64.50
Embryology	65.03	....	....	....	65.03
English	66.61	66.91	....	....	66.76
Feeds and Management	....	....	72.19	....	72.19
Food Hygiene	....	....	....	66.87	66.87
Genetics	....	66.56	....	....	66.56
Hygiene and Public Health	....	....	....	68.00	68.00
Nutrition	....	....	71.71	....	71.71
Obstetrics	....	....	78.01	....	78.01
Parasitology (Entomology)	....	63.96	....	....	63.96
Parasitology (Helminthology)	....	....	65.46	....	65.46
Pathology	....	61.23	64.51	72.63	66.12
Physics	65.33	....	....	....	65.33
Physiology	....	64.45	....	....	64.45
Pharmacology	....	74.87	....	....	74.87
Poultry Husbandry	68.95	....	....	....	68.95
Radiology	....	....	70.68	....	70.68
Reportable Diseases	....	....	....	69.18	69.18
Surgery	....	....	79.38	68.83	74.11
Therapeutics	....	....	....	74.71	74.71
Virology	....	....	....	71.90	71.90
Zoology	71.51	....	....	....	71.51
Class Averages	69.43%	67.28%	72.68%	71.62%	70.25%

FIRST YEAR

Number of Students — 80

STANDING ATTAINED	NUMBER OF STUDENTS	PERCENTAGES
1st Class Honours	17	21.25
2nd Class Honours	33	41.25
Pass Standing	2	2.50
Conditioned with 1 supplemental	18	22.50
Conditioned with 2 supplementals	4	5.00
Failures	6	7.50
	80	100.00%

Class Averages by Subjects

Animal Husbandry	73.07
Animals in Nature	77.84
Botany	69.13
Chemistry (Inorganic)	71.09
Chemistry (Organic)	70.70
Economics	64.50
Embryology	65.03
English	66.61
Physics	65.33
Poultry Husbandry	68.95
Zoology	71.51
Class Average on All Subjects	69.43

Number Registered in Fall	89
Midsession Failures	5
Withdrawals	4
Spring Final Examination Class	80

SECOND YEAR

Number of Students — 94

STANDING ATTAINED	NUMBER OF STUDENTS	PERCENTAGES
1st Class Honours	9	9.57
2nd Class Honours	52	55.32
Pass Standing	20	21.28
Conditioned with 1 supplemental	5	5.32
Failures	7	7.45
Aegrotats	1	1.06
	94	100.00%

Class Averages by Subjects

Anatomy	68.39
Biochemistry	74.20
Clinical Chemistry	64.91
English	66.91
Genetics	66.56
Parasitology (Entomology)	63.96
Pathology	61.23
Physiology	64.45
Pharmacology	74.87
Class Average on All Subjects	67.28

Number Registered in Fall	104
Midsession Failures	10
Spring Final Examination Class	94

THIRD YEAR

Number of Students — 113

STANDING ATTAINED	NUMBER OF STUDENTS	PERCENTAGES
1st Class Honours	27	23.89
2nd Class Honours	82	72.57
Conditioned with 1 supplemental	4	3.54
	113	100.00%

Class Averages by Subjects

Bacteriology	68.66
Diseases of Fur-Bearing Animals	72.00
Diseases of Horses	71.35
Diseases of Poultry	71.13
Diseases of Ruminants	74.35
Diseases of Small Animals	79.19
Diseases of Sheep and Swine	78.86
Feeds and Management	72.19
Nutrition	71.71
Obstetrics	78.01
Parasitology (Helminthology)	65.46
Pathology	64.51
Radiology	70.68
Surgery	79.38
Class Average on All Subjects	72.68

Number Registered in Fall	113
Spring Final Examination Class	113

FOURTH YEAR

Number of Students — 126

STANDING ATTAINED	NUMBER OF STUDENTS	PERCENTAGES
1st Class Honours	24	19.05
2nd Class Honours	95	75.40
Pass Standing	5	3.97
Conditioned with 1 supplemental	1	.79
Conditioned with 2 supplementals	1	.79
	126	100.00%

Class Averages by Subjects

Animal Reproduction	71.23
Bacteriology	67.87
Business Practice and Jurisprudence	70.63
Diseases of Horses	76.45
Diseases of Ruminants	72.79
Diseases of Small Animals	79.95
Food Hygiene	66.87
Hygiene and Public Health	68.00
Pathology	72.63
Reportable Diseases	69.18
Surgery	68.83
Therapeutics	74.71
Virology	71.90
Class Average on All Subjects	71.62

Number Registered in Fall	127
Ill	1
Spring Final Examination Class	126

DEPARTMENT OF ANATOMY

V. R. Brown, V.S., D.V.M.

The efforts of this department are directed toward perfection in methods of teaching gross anatomy. When the theoretical and practical phases of the academic duties have been adequately taken care of, the remaining time is devoted to investigational work.

There was relief from the heavy teaching load carried by the Department of Anatomy during the previous year. The Second Year class was the only class to take work in the Department. This was because of the inauguration of the five year course, in which all anatomy courses are covered in the Second Year. It remains to be seen how satisfactory this arrangement will be. There may be an advantage in taking small amounts of a subject over an extended period. Some consider that more lasting impressions are gained by repeated exposure.

The staff of this department remained the same as during the previous year. Dr. J. H. Ballantyne and the writer gave the necessary lectures and supervised the laboratory work.

From time to time, anatomical specimens are prepared for other departments. Most of these specimens are osteology preparations. The staff of this department has been frequently consulted regarding x-ray interpretations, when a point of morphology is questionable. This has been profitable from our point of view since it tends to keep one actively thinking along clinical lines. Cases considered include nearly all types of domestic animal.

The Department assisted with courses in artificial insemination given at the College during the year. Four such courses were given—fewer than during the fiscal year 1948-49. It has been a pleasure to assist in this work.

The Hydro-Electric Power Commission has provided an electrocutor for the euthanasia of domestic animals, the prime purpose being to determine the least amount of electric energy dangerous to cattle. It has been possible to collect some data on other animals, but so far, cattle have not been available for this project. Perhaps in the not too distant future, some provision may be made for this work.

The Poultry Marketing Branch of the Federal Department of Agriculture has been supplied with sagittal sections of chickens mounted in plastic. The purpose of these was to demonstrate the position of the arteries and veins in the area where the birds are bled at killing time. The specimens also show the position of the viscera. It is anticipated that this will give the person dressing fowl a better understanding of the procedure.

Some difficulties have been encountered in plastic embedding. Some of these have been solved but others will require further consideration. If it were possible to mount tissues in plastic, this would be the ideal method of preparing museum specimens. Using the plastic material available, the variable nature of the reaction makes it impossible to predict the outcome. Undoubtedly there is one type of plastic that would answer all demands if it could be found.

During the winter, considerable work was done tracing the arteries, veins and nerves and studying the heart of an ectopia cordis case. This animal, a heifer, was allowed to live to nearly three years of age. She was in apparently good phy-

sical condition, but because she would not conceive it was decided to destroy her and study the arrangement of the heart and blood vessels. A complete description of this case will be found on page 97.

In the early spring, a filly was brought to the College for examination and possible treatment. This animal lacked a tail and had no external opening from the bowel or urogenital tract. It was destroyed and carefully dissected and studied. This case is reported on page 109.

SECTION OF HISTOLOGY, EMBRYOLOGY AND GENETICS

J. P. W. Gilman, B.V.Sc.

Throughout the past year, the personnel of this section have been primarily concerned with teaching duties. However, considerable progress has also been made with regard to the several investigational projects commenced and reported in the Report of the Ontario Veterinary College for 1948. In addition, two new projects have been undertaken and extension services in the field of applied genetics have been considerably extended.

That we have been able to make this progress, despite the temporary absence of one of our two permanent faculty members, has been to a considerable degree due to the unfailing endeavour of our permanent technician, Miss Ruth Saison. The aid given during the summer months by two full-time student assistants and during the academic year by three part-time student assistants has also proved invaluable, as all of these helpers have worked both diligently and efficiently.

TEACHING

Unfortunately, in June, 1949, Dr. B. J. McSherry was transferred to the Department of Pathology to take the place of Dr. J. D. Schroder during the latter's leave of absence, and was consequently lost to us for the academic year 1949-1950. This move naturally impeded the progress made in fields other than teaching. In the latter sphere it was possible to render adequate service only because of the fact that Histology was not taught during the past year, as a result of the reorganization of the curriculum concomitant with the change-over from a four to a five year undergraduate course in veterinary medicine at this institution.

These changes made it possible for a single instructor to handle the teaching load in the remaining two subjects (see Table I). However, it should be pointed out that the handling of laboratory exercises, involving the use of the microscope by 40 or more students hitherto unacquainted with the instrument, without the aid of either assistants or demonstrators, is not entirely satisfactory.

TABLE I

NUMBER OF HOURS DEVOTED TO EACH SUBJECT

SUBJECT	TERM	HOURS PER STUDENT LECTURE	LABORATORY	TOTAL	TOTAL TEACHING HOURS GIVEN BY INSTRUCTOR
Embryology	Spring	26	60*	86	146
Genetics	Fall Spring	22 26	....	48	48
		TOTAL			194

* Laboratory periods taken in two sections.

Embryology

The teaching time allotted to this course has been increased in the new five year curriculum from approximately 44 to 86 hours. Although this increase allows for a broadening of the subject matter presented, the apparent gain is greatly restricted by the fact that the student, in the first year of his five year course, has had no instruction in anatomy whatsoever, and is not, by the commencement of the spring term, familiar with the microscope, or the concept of the cellular organization of the mammalian body. As a result of this lack of prerequisites to embryology, it was found necessary to devote a considerable portion of the additional time granted to introductory lectures and laboratory exercises in these fundamentals.

More pig embryology slides, specimens and charts have been added to our class laboratory materials, in addition to several new models of stages in the development of the chick. Several practical laboratory tests were given at intervals during the course in embryology, and the standings obtained were incorporated into the final grading of the student. This practice has been found eminently satisfactory and is being encouraged by this section in all of our laboratory subjects.

Genetics

The course in genetics was made up essentially of lectures, supplemented with classroom and field demonstrations. During the fall term, 20 hours were devoted to a study of formal genetics. The remaining 26 hours, during the spring term, were utilized for discussing aspects of applied genetics of particular interest to the veterinarian. Special attention was paid to such problems as (1) practical advantages and limitations of various animal breeding plans, (2) the role of heredity in infertility in domestic animals, (3) inherent disease resistance, (4) biochemical mutations and variations in micro-organisms, and (5) immuno-genetics. In this latter field, some lectures were given by Mr. R. Humble of the Department of Extension in connection with parenthood testing in cattle and haemolytic icterus in foals.

During the past year, much time and thought was devoted to reorganizing this course for its third consecutive year of presentation. Much demonstration material has been collected and was utilized to compensate for the lack of laboratory time available. In this regard, the two mouse colonies maintained by this section, as well as the museum specimens that are gradually being acquired, proved extremely useful.

INVESTIGATIONAL WORK

One of the three projects in the field of developmental genetics reported in the Report of the Ontario Veterinary College for 1948, namely the problem of rhinitis in swine, was brought to a close. A full account of this work has been published elsewhere.* The remaining two projects reported at that time are still under study.

Two new projects were started during the past year. One of these, a joint project in co-operation with the Nutrition Department of the Ontario Agricultural College, has been underway for a considerable portion of the year. The other is still in the organizational stage. Each of these projects will be discussed separately on the following pages.

* Gilman, J. P. W. Inherited Facial Conformation and Susceptibility to Infectious Atrophic Rhinitis of Swine. Can. Jour. Comp. Med. 13 (1949): 266.

Congenital Cataract in Jersey Cattle

Further data have been gathered from the two herds under investigation. To date, 15 affected calves have been reported in the Ontario herd, and we are raising two of their heifers on the College experimental farm. The elder of these is at present in calf to a young bull (obtained from the Quebec herd) who is afflicted with the same defect. These two animals were obtained during 1948. The heifer calf shown in Figure 1 was acquired this spring and is also being raised for breeding-test purposes.

Fig. 1. Heifer calf with congenital cataract, shown with normal-eyed half brother (left).

The incidence of the defect has increased rather severely in the Quebec herd, in which four cataractous calves were born during 1949 and two more during the first two months of 1950. A breeding programme, designed to gradually eliminate the carrier animals from this herd, while still maintaining the otherwise eminently desirable blood lines established over many years of breeding, has been outlined and is being put into effect this year.

A statistical analysis of the matings within one of the herds lends strong support to the simple recessive gene hypothesis previously advanced to explain the appearance of this defect. This analysis is summarized in Table II and, as will be noted, the ratio observed in this herd is a very close fit to the 7:1 ratio expected

when a known carrier male is mated to females, 50 per cent of which should themselves be carriers.

TABLE II

CLASS	OBSERVED	EXPECTED	DIFFERENCE (OBS.—EXP.)	$\frac{(O-E)^2}{E}$
Normal Eye	82	80.5	+1.5	0.028
Cataract	10	11.5	−1.5	0.196
	92	92.0	0.0	$x^2 = 0.224$

$x^2 = 0.224$; d.f. = 1; $p > 0.5$

e.g. The difference between the observed and expected ratio is *not significant;* deviations of 1.5 or greater can be expected to occur in from 50 per cent to 70 per cent of similar trials due to chance alone, when the true ratio is actually the 7:1 ratio of a simple autosomal recessive when a known carrier is mated to his daughters out of non-carrier dams.

From further enquiry it appears that at least two other herds, in western Canada, have also had several similar blind calves born in the last few years. All the carrier animals so far investigated trace back to a common ancestry, and these ancestors are present in most of the better Jersey herds in Canada. Further work is planned involving a histological study of the affected lenses as well as a developmental study of affected embryos in an attempt to clarify the nature of the changes resulting in this rather costly inherited defect.

Fig. 2. Thirty-three day embryo litter mates (28 mm.). Note abnormal tongue development (1) and retarded palate closure (2) of embryo at left.

Hereditary Abnormalities in Swine

A study of the skeletal growth changes involved, which is designed to augment the now completed investigation into the type of inheritance responsible for these anomalies, is now underway. A single genetic factor, adhering to simple recessive Mendelian laws, is responsible for changes of widely varying severity, involving all the major long bones of the limbs, the development of the lower jaw, incisor teeth, palate and tongue (see Figure 3). It is of interest to note that these changes can be observed in 33 day old embryos (see Figure 2). This would indicate that the responsible gene exerts its influence at a very early stage of intra-uterine development. Furthermore, as affected pigs are usually born alive and at full term (see Figure 4) within the range of birth weights of their normal sibs, it would appear that the adverse effect of this mutation is also limited to a comparatively short, critical time period during development.

Fig. 3. Upper—abnormal piglet (1,075 gms. birth weight) with flexed and shortened legs.

Lower—normal litter mate (990 gms. birth weight).

Carrier stock is still being maintained and work on the histo-pathological picture both at birth and in the early embryo, is being continued. A detailed account of this work, as well as of the growth analyses mentioned above, will be published elsewhere during the coming year.

Nutritional Requirements for Successful Reproduction

Work was started on an investigation of the effects of deficient maternal diets on the development of the embryo in swine. In a co-operative project with

Fig. 4. SAME TWO PIGLETS AS IN FIGURE 3. NOTE THICKENED TONGUE WITH NARROW, UNDER-DEVELOPED APEX, CLEFT PALATE AND ABSENCE OF THIRD INCISORS AND CANINE TEETH OF ABNORMAL ANIMAL.

the Department of Nutrition of the Ontario Agricultural College, sows were maintained during the first five weeks of pregnancy on purified diets extremely low in riboflavin, but complete in other vitamins known to be required. Comparison with litter mates fed the same diets supplemented with riboflavin indicated no unfavourable effects from the deficiency. Appetite was maintained, the young sows continued to grow, litter size was not influenced and no abnormalities were observed in the young at birth which could be attributed to the deficient diet. Investigations are continuing on the possible effects resulting from longer periods of dietary riboflavin deficiency.

Umbilical Hernia in Cattle

The apparent increase in the frequency of umbilical hernia in dairy cattle during the last few years has been noticed by workers in the clinical department at the Ontario Veterinary College. From the records kept of cases operated on by Dr. C. A. V. Barker, it would seem that certain families of Holsteins are particularly susceptible to this defect. As a result of this information being brought to our attention by members of the above-mentioned department, it was decided to undertake a population study to attempt to ascertain whether certain sires (suspected carriers) were leaving significantly greater numbers of herniated calves than were other unrelated sires. This information is being gathered in co-operation with the nearby artificial insemination unit at Waterloo and will involve a survey of their members during the course of which it is hoped that considerable other information may be gathered relative to undesirable conformation and to disqualifications that may have a hereditary etiology. The officers of the Waterloo Cattle Breeding Association and Mr. McLoughry, the agricultural representative

for that district, have been most helpful in organizing this study, which it is hoped will be completed during the fall of 1950.

ROUTINE LABORATORY WORK AND EXTENSION

In the laboratory, work has been continued. Miss Saison has added material to our slide libraries and has assembled teaching sets of microscopic slides for both Embryology and Histology. In addition, several models and charts have been made and special staining techniques have been carried out for other departments within the College.

Our facilities and aid were given during the summer of 1949 to the Department of Zoology, Ontario Agricultural College, in making sections for demonstrations and class use in their course in Histology.

The small Genetics Mouse Colony, consisting of four mutant strains of mice and one strain of inbred rats, was maintained throughout the year. Mouse material from this colony was used for demonstration purposes, while the rats are being used for experimental work in the nutritional experiment mentioned previously.

A second mouse colony was established early in the fall of 1949, at the suggestion and primarily for the use of the Department of Industrial Hygiene of the Public Health Department, Toronto. This is a colony made up of two different strains of cancer-susceptible mice: (1) C3H—mammary tumour susceptible mice; and (2) C57—black. Both original stocks were obtained from the Jackson Memorial Laboratories, Bar Harbour, U.S.A. The maintenance of this colony, and of the above-mentioned colony, has been entrusted largely to student labour, and, particularly in the case of the cancer colony, accounts for a very considerable expenditure of time and effort, as detailed and accurate records must be kept of all breeding operations, births, as well as complete records of all autopsy findings on dead animals.

Several cases suspected of being of a hereditary nature have been followed up by this section, and wherever necessary, advice in connection with the changing of breeding programmes to eliminate undesirable inherited characters has been given. The number of such cases being brought to our attention appears to be increasing steadily, thanks to the co-operation of members of the Department of Medicine.

CLINICAL DEPARTMENT

DEPARTMENT OF CLINICAL MEDICINE

R. A. McIntosh, B.V.Sc., M.D.V.

The duties of this department consist in giving instruction in pharmacy, material medica; special therapeutics; diseases of cattle, sheep and swine; obstetrics and breeding hygiene; diseases and accidents related to pregnancy and parturition; artificial insemination; the examination of seminal fluid; pregnancy diagnoses; breeding diseases, sterility and infertility. Clinical instruction and instruction in surgical procedure in cattle, sheep and swine are also given.

In addition, members of the staff of this department undertake and accomplish a considerable amount of extension work in the form of investigational visits to determine the nature of outbreaks of disease, and are consulted in difficult and puzzling cases by practising veterinarians. Members of the staff address meetings of veterinary associations, livestock organizations, and Junior Farmer short courses, on subjects related to veterinary science. Professional advice is given. Medicinal agents are dispensed to office callers. A large volume of correspondence concerning disease conditions which affect livestock is referred to this department for reply. When such inquiries come from districts where veterinary service is not available, trial parcels of medicine are sent to the owner.

The Department of Clinical Medicine also provides veterinary service in connection with the livestock belonging to the Ontario Agricultural College, and also assists the veterinarian of the Ontario Reformatory when such help is required. Finally, the Department conducts post-mortem examinations on cattle, sheep and swine, when such animals are sent to the College for diagnosis of disease.

The personnel of the Department and allocation of the work is as follows:

R. A. McIntosh—head of the Department; instructor in materia medica, pharmacology, diseases of swine, and special therapeutics; and director of clinical instruction and extension (re investigation and addressing meetings).

J. A. Henderson—instructor in diseases of ruminants and in clinical subjects; also participates in extension work (investigation, addresses to meetings, and clinical service).

C. A. V. Barker—instructor in obstetrics and breeding hygiene; clinical instruction and surgical demonstration; artificial insemination and pregnancy diagnoses; extension service in reproductive diseases.

F. E. Wagner—instructor and lecturer on pharmacy.

The following clinical services were rendered during the past fiscal year:

Cattle

With reference to the cattle clinics, 450 animals were handled and a number of post-mortem examinations were conducted in connection with such cases.

Horses

The responsibility of attending to the needs of the horses belonging to the Ontario Agricultural College and to some extent those of the Ontario Reformatory at Guelph rests with this department. Upwards of 40 cases were handled last year.

Swine

The value of pork and pork products has been kept at a fairly high level and there has been an increasing demand for services relating to diseases occurring in this species of livestock. Accordingly, during the past year, this department handled 415 cases, including surgical and sick cases, and post-mortem examinations. There were 5,169 contact pigs in connection with the post-mortem examinations.

Sheep

Forty-two cases were submitted to the clinic. There were 33 post-mortem examinations on animals of this species and 2,308 contact animals in connection with these examinations.

STERILITY INVESTIGATIONS — CATTLE
(Data Collected by Dr. C. A. V. Barker)

Herd Number	Number Examined	Brucellosis Prevalent	Infectious Vaginitis	Cervicitis	Metritis	Pyometra	Tubo-Ovarian Lesion	Cystic Follicle	Retained Corpus Luteum	Pregnant	Functional (No Lesion)	Congenital	Normal	Infertile Bull	Trichomoniasis	Vaginal Prolapse	Vaginal Stenosis
1	6	....	....	....	3	....	....	....	....	....	....	....	2	....	1	....	....
2	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
3	2	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....
4	6	....	....	....	2	....	....	....	....	2	2	....	....	....	....	....	....
5	3	....	....	....	....	....	....	....	....	....	....	....	1	....	2	....	....
6	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
7	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
8	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
9	2	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....
10	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
11	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
12	22	....	11	....	....	....	....	....	....	11	....	....	....	....	....	....	....
13	4	....	....	....	1	....	....	....	1	....	....	2	....	....	....	....	....
14	5	....	....	....	2	....	....	....	....	....	....	....	3	....	....	....	....
15	2	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....
16	12	....	....	....	....	....	....	....	....	5	....	....	7	....	....	....	....
17	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
18	17	....	....	....	....	....	....	6	....	....	....	11	....	....	....	....	....
19	12	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
20	3	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
21	3	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
22	12	....	11	....	....	....	....	1	....	....	....	....	....	....	....	....	....
23	4	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
24	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
25	11	....	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....
TOTALS	134	....	55	....	8	....	....	9	1	18	5	13	18	1	4	1	1

SURGERY

W. J. R. Fowler, V.S., B.V.Sc., D.V.M., Chevalier de Merite Agricole de France
and
George Cairns, D.V.M., M.R.C.V.S.

The interest shown in this department by veterinary practitioners and owners of livestock has been most gratifying and has added greatly to the value of the clinics, from the viewpoint of both the Department and the student. Clinics

are held throughout the academic year, and at the owner's convenience during the summer months. The amount of clinical material submitted during the latter period has markedly increased.

Of particular interest was the case of a valuable thoroughbred horse imported from Virginia by the owner. This animal could not be shown because of an enlarged thyroid gland. As there was no response to continued medicinal treatment, it was decided that a thyroidectomy was necessary. This operation, a rare one in large animal practice, was most successful, and the horse will return to the show-ring with only a slight scar.

Another unusual case was that of a six-year-old Clydesdale gelding (see Fig. 1) which was suspected by the attendant veterinarians of suffering from pernicious anaemia (swamp fever). The horse was put on an isolation farm. Clinical and laboratory examination led us to believe that the condition was not swamp fever, but rather a disease of the lymphatic system giving rise to anaemia. Medicinal treatment was instigated using procaine penicillin in large doses. As there was no response, aureomycin was given. Finally a large tumourous mass was found in the region of the kidneys. Euthanasia was carried out, and post-mortem examination revealed a malignancy combined with infection. The growth was diagnosed as a lymphosarcoma.

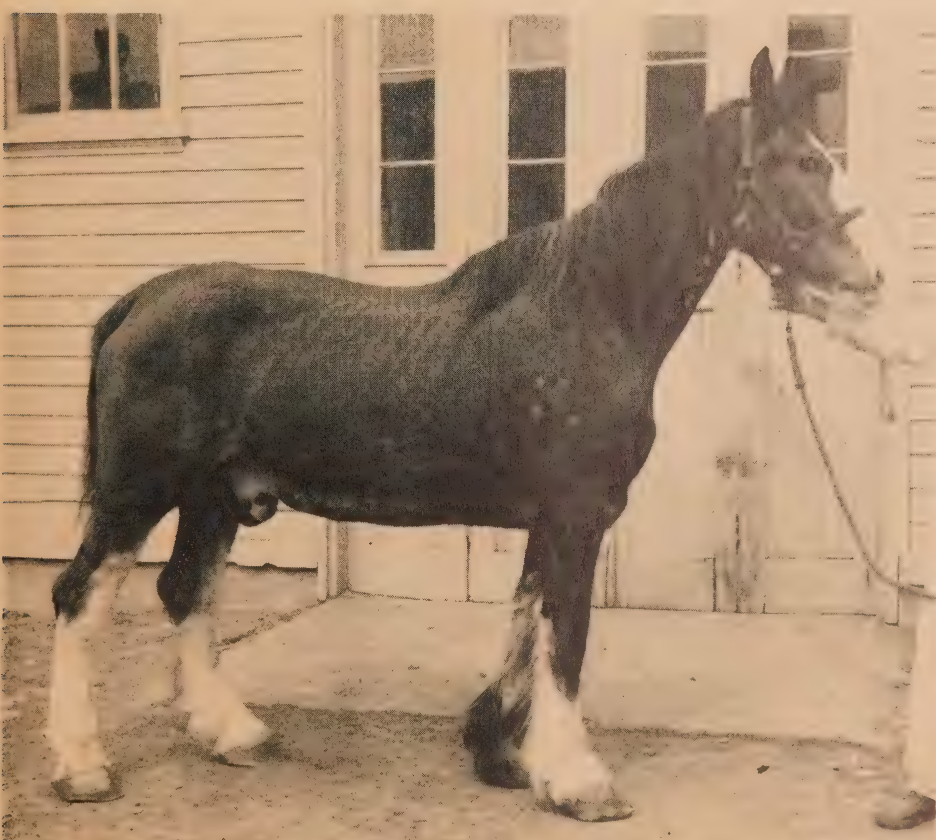


Fig. 1. Clydesdale gelding showing effects of malignant growth and infection.

Recently, we have tested a new anaesthetic for use in equine surgery. This anaesthetic, a British product called 'Anavenol' (B-naphthoxyethanol), was found to have certain advantages when anaesthesia of short duration was called for, and lacked the disadvantage of chloral anaesthesia which we have used almost exclusively in recent years. We feel it should be made compulsory to use a general anaesthetic for the castration of large animals after they have reached a certain age. 'Anavenol' would answer the purpose better than any form of anaesthetic we have had to date, as the patient regains its feet in 15 to 30 minutes after administration of the product.

The following is a summary of the clinical cases submitted during the 1949-50 fiscal year:

NATURE OF CASE	NO. OF CASES
Tumours	
Exuberant granulation	1
Fibroma (stifle)	1
Fibroma (eyelid)	1
Fibroma (sheath)	1
Granuloma	5
Lymphosarcoma	1
Sarcoma	3
Wart	1
Injuries	
Cervical injury	1
Contusion	5
Foot injury	12
Fractured ribs	1
Laceration of lower lip	1
Nail puncture	1
Puncture wound	1
Saddle sore	1
Sprained ligaments	22
Sprained tendons	18
Wire cuts	1
Exostoses	
Osselets	15
Ringbone	10
Splints	12
Spavin	7
Infections	
Botryomycosis	1
Canker	1
Fistula	3
Metritis	2
Tetanus	1
Vaginal infection	3
Respiratory Conditions	
Pneumonia	1
Roaring	6
Glandular Conditions	
Cystic ovaries	1
Goitre	1
Nymphomania	3
Ophthalmic Conditions	
Cataracts	1
Periodic ophthalmia	1
Nervous Diseases	
Chorea	1
Locomotor ataxia	1
Genito-Urinary Conditions	
Cryptorchid	4
Sterility	1
Gastro-Intestinal Conditions	
Constipation	1
Gastro-enteritis	1
Incarceration of bowel	1
Skeletal Abnormalities	
Arthritis	1
Carpitis	4
Gonitis	1
Navicularthritis	4
Sesamoiditis	8
Sidebones	6
Tarsitis	1
Special Operations	
Castration	7
Hernia (scrotal)	3
Hernia (umbilical)	7
Ridgling	3
Tail set	1
Thyroidectomy	1
Miscellaneous	
Abscess (withers)	2
Azoturia	1
Bursitis	1
Coccygeal curvature	2
Dental conditions	12
Haemorrhage from penis	1
Laminitis, chronic	1
Seedy toe	2
Sinusitis	1
Stenosis	1
Vaginal stricture	1
TOTAL	229

RADIOLOGY

A. E. Broome, M.D., F.C.C.P.

In the past year, the teaching schedule of the Radiology Section was extended and new x-ray equipment purchased. Experimental work was continued and patients submitted by the large and small animal clinics were examined and treated when necessary. Many animals from the Fur-bearing Animals Section were submitted for diagnosis and x-ray treatment.

TEACHING

During the early portion of the academic session the demonstration of x-ray findings was incidental to clinical groups. At mid-term a period of film criticism and interpretation was instituted for groups from the junior year. For three-quarters of an hour, once weekly, all films taken during the preceding week were reviewed and the interpretations correlated with the patients' histories and physical findings. Individual questioning on film quality, positioning and findings revealed the fact that this type of instruction is essential for even a rudimentary knowledge of x-ray diagnosis.

EQUIPMENT

New x-ray equipment purchased included a skin therapy apparatus and a teaching stereoscope.

The skin therapy machine has been calibrated mechanically and biologically and has been put into use. The clinicians have reported favourably on the results up to date. The lesions treated included eczema, dermatitis, furunculosis, erysipelas and subcutaneous abscess. Experimental radiation of more deeply seated inflammatory lesions is also being done.

The teaching steroscope allows for three-dimensional viewing of films simultaneously by an individual student and the demonstrator. It is especially valuable for anatomical studies and for orienting the lesion with surrounding structures.

Extra batteries of film view-boxes were purchased for use in the film-viewing room and for the Department of Anatomy.

EXPERIMENTAL WORK

The Section is continuing the attempt to make x-ray diagnosis possible in the thicker structures of large animals and is being assisted in this by work at the National Research Council in Ottawa. If this experimental work shows encouraging results, the space requirements of the already overcrowded Section will be markedly increased.

ROUTINE DIAGNOSES AND TREATMENTS

During the past fiscal year, the following x-ray examinations were made and treatments given:

	DOGS AND CATS	CATTLE	HORSES	FUR-BEARING ANIMALS	EXPERI-MENTAL ANIMALS	TOTAL	FOLLOW-UP EXAMI-NATIONS
1949							
April	15	3	7	5	1	31	7
May	10	6	3	6	2	27	6
June	10	2	4	9	1	26	8
July	19	....	14	7	....	40	12
August	21	1	2	....	2	26	12
September	23	2	6	1	1	33	16
October	36	2	29	2	....	69	20
November	29	4	7	14	....	54	18
December	20	1	5	1	....	27	11
1950							
January	40	2	5	3	....	50	14
February	47	....	5	....	2	54	14
March	44	2	7	3	2	58	16
TOTALS	314	25	94	51	11	495	154

DEPARTMENT OF PARASITOLOGY

A. A. Kingscote, V.S., D.V.M., D.V.Sc.

GENERAL

The permanently employed staff of the Department has consisted of two veterinarians, a biologist, a laboratory assistant and a stenographer. Eleven additional assistants were employed for varying periods of time to work on extension projects, research, and departmental maintenance. All members of the staff have worked diligently and conscientiously. Faculty personnel, in particular, have devoted much overtime to the preparation of lectures, examination of students' work, and other projects. All graduate members of the Department pursued studies towards, or qualified for, new degrees, during the year.

In addition to work performed by our own staff, much valuable assistance in the form of advice, time and materials was received from personnel of other departments of the Ontario Veterinary College, the Ontario Agricultural College, the National Film Board, and the Fish and Wild Life Division of the Department of Lands and Forests.

Regular courses consisting of 82 lectures and 204 hours of laboratory exercises were prepared and given on protozoology, entomology and helminthology, to 207 Second and Third Year students. Because of their size, classes were divided into two sections for laboratory exercises. Extramural lectures, papers, and demonstrations were given at veterinary and public health conferences and at farmers' meetings. A special course of lectures was delivered to post-graduate students completing a veterinary public health course. An active part was taken in instructing at the provincial schools inaugurated for the training of inspectors in warble fly control work.

Considerable time was devoted to administrative duties on 17 permanent or *ad hoc* committees and secretarial duties of the Ontario Veterinary College Alumni Association.

Diseases of horses, cattle, sheep, swine, fur-bearing, wild, and zoo animals, and of poultry were investigated and control measures recommended. The Department was consulted and gave advice on public health problems and on the control of food and household pests. Several hundred letters and reports were prepared in answer to inquiries or in connection with the results of diagnoses.

Extension services, surveys or other duties included visits to farms and attendance at various meetings. Personnel of the Department attended conferences of the Laboratory Section, Canadian Public Health Association, the American Veterinary Medical Association, the American Society of Protozoologists, the American Society of Parasitologists, and the American Association for the Advancement of Science.

EQUIPMENT

New and modern items of laboratory equipment for teaching, routine and research work have been obtained. Stereoscopic, as well as compound microscopes are available now for all students. Other items of equipment procured include a Bell and Howell motion picture projector, and a Bausch and Lomb microprojector with a mechanical feed carbon arc lamp.

Fig. 1. A SECTION OF THE PARASITOLOGY LABORATORY.

In the spring of 1949, the Department established an experimental turkey farm, with 10 units of modern equipment and facilities for raising 500 birds. Four electric brooders were obtained.

TUTORIAL

Complete courses in veterinary protozoology, entomology and helminthology were given to various classes at the College. All lecture courses were revised and brought up to date. Considerable progress was made in increasing stocks of teaching material. The Department is better supplied with such material for teaching purposes than it has been at any previous time. A number of parasites were collected and presented to the College by graduates and students.

(Photograph by the Ontario Agricultural College Extension Department)

Fig. 2. TURKEY SHELTERS AND PENS AT THE ONTARIO VETERINARY COLLEGE EXPERIMENTAL FARM IN WHICH THE TRIALS WITH VARIOUS DRUGS TO PREVENT BLACKHEAD WERE CONDUCTED.

Additional material was acquired for the museum. The preparation of visual aids to teaching again received attention during the year. A number of kodachrome slides, film strips and motion picture films were added to the Department's library. These films illustrate the nature and control of various parasitic diseases. Our technician has designed and completed a number of exceptionally fine teaching charts and models of parasites and illustrations showing their life histories, lesions, and control. A number of additions were made to the collection of photographs depicting clinical cases of parasitism. Several hundred additional preparations of microscopic parasites and tissue sections were purchased from biological supply houses or prepared in the laboratories. Work on preserving parasites in plastics was continued.

SUMMARY OF PARASITOLOGICAL LABORATORY AND FIELD INVESTIGATIONS
April 1, 1949, to March 31, 1950

	HORSES	CATTLE	SHEEP	SWINE	DOGS AND CATS	POULTRY AND MISCEL-LANEOUS	TOTALS
1. Clinical examinations	83	477	507	12	16	594	1,689
2. Protozoan, arthropod and helminth identifications (exclusive of faecal examinations)	12	9	3	7	16	15	62
3. Faecal examinations for protozoan and helminth infections	132	19	54	8	93	102	408
4. Skin scrapings for mange and ringworm	3	21	3	6	47	....	80
*5. Post-mortem and/or examinations of tissues and organs	2	5	14	8	15	994	1,038
6. Liver fluke survey and miscellaneous	....	....	....	....	....	419	419
7. Examination of parasites submitted by students	....	....	....	....	....	8,081	8,081
TOTALS	232	531	581	41	187	10,205	11,777

* The number of post-mortem examinations conducted in co-operation with other departments of the College are not recorded here.

RESEARCH INVESTIGATIONS AND EXTENSION SERVICES

PROGRAMMES FOR PROVINCE-WIDE CONTROL OF PARASITIC DISEASES

Short- and long-term programmes to reduce provincial losses from parasitism which were previously prepared are still undergoing consideration and development. The plans have taken into consideration requirements for an enlarged staff, province-wide educational campaigns and the creation of facilities for post-graduate studies. The object of the programmes is to reduce Ontario's loss caused annually by diseases and deaths of parasitic origin. The programmes, in detail, were submitted as recommendations relative to agriculture in the Province of Ontario to a Select Parliamentary Committee.

PROTOZOOLOGY

Most of our laboratory investigations have concluded with routine diagnoses and recommendations for control of common protozoan diseases. Diseases investigated under this heading have included coccidiosis, enterohepatitis, amoebiasis, trichomoniasis and sarcosporidiosis. No further work on Leucocytozoon

(Original Photograph)

Fig. 3. Turkeys administered "Enheptin T" survived when exposed continuously to "blackhead" infection. Other birds in adjoining untreated control pens died.

infections in turkeys was conducted this year as no enzootics of the disease were reported.

Infectious Enterohepatitis (Blackhead) in Turkeys

Control studies of enterohepatitis (blackhead) in turkeys were continued in the summer of 1949. The experiments were conducted by Dr. J. K. McGregor. In the initial experiment, 495 birds were used. Nine chemicals or other agents were tested for their prophylactic value. These included metachloridine (2-metanilamido-5-chloro pyrimidine); tetramethylthiuram disulphide; "Antabus" (tetraethylthiuram disulphide); hexachlorethane; sulphaquinoxaline; Compound P-196; Compound P-29; Compound 5051—"Enheptin T" (2-amino-5-nitrothiazole); bacitracin. Among the materials tested, "Enheptin T" gave protection against infection when fed continuously at the 0.05 per cent level in the food. A full report of this work has been published[1].

An additional 100 turkeys were procured and the replication experiments with "Enheptin T" gave very high protection, similar to that obtained in the original trials. It was also ascertained that the preventive dosage of 0.05 per cent, under the condition of our experiments, proved of little value in curing clinical cases of the disease. Preliminary tests indicated also that the drug was not accumulative, as 16 days after its use was discontinued in the food exposed birds developed symptoms of the disease.

[1]. McGregor, J. K. Observations on the Prophylactic Value of Certain Drugs for Enterohepatitis Infection (Blackhead) in Turkeys. Can. Jour. Comp. Med. 13 (1949): 257.

(Original Photograph)

Fig. 4. Lesions caused by psoroptic mange mites in the ear of a rabbit.

ENTOMOLOGY

The major projects in the field of entomology have been control investigations in connection with the oestrid parasites of cattle. A large part of the routine laboratory work has been that of identifying and recommending control measures for common ectoparasites and food pests.

Warble Fly Control

The provincial programme for warble fly control in cattle has been progressively developed since 1947. This work, as in former years, has been conducted jointly with personnel of the Live Stock Branch of the Ontario Department of Agriculture, the Ontario Agricultural College, and with the Provincial Entomologist, forming collectively the Ontario Warble Fly Committee. Through the Committee liaison has been maintained with representatives of the Dominion Government and investigators in the United States.

To obtain effective community control of cattle grubs, the necessity of having properly trained inspectors to guide and supervise power spraying and hand-dressing programmes was demonstrated. To train the required inspectors, schools were organized at convenient centres and members of the Committee acted as instructors and demonstrators.

A 600-foot addition to the Dominion Department of Agriculture motion picture film "Warble Fly" was made jointly by personnel of the two colleges at Guelph to illustrate the technique of treating cattle and disinfecting equipment, under Ontario methods of farming. Nine copies of the motion picture were made available for circulation in the Province.

The recommendations of the Committee for making amendments to the Warble Fly Control Act and drafting of regulations relative to the Act were assented to on March 9, 1949, when the Warble Fly Control Act of 1947 was repealed.

To evaluate the effect of treatments, annual grub population studies are being continued under the supervision of the Committee.

The number of townships passing by-laws for community control of warble flies has increased considerably, with the result that it is estimated that approximately 250,000 head of cattle will be sprayed or hand-dressed for grubs in the spring of 1950.

Detailed reports and recommendations for applying control measures in municipalities have been made available through the Committee or Live Stock Branch to all concerned.

Sheep Nose Bot Control Experiments

The research project initiated in 1948 with the object of developing an economical, practical and effective method of destroying sheep nose bots was temporarily discontinued in 1949. It is planned to resume work on this problem during the summer of 1950.

Wohlfahrtia vigil (Grey Flesh Fly) Infestation in Fur-bearing Animals

A continued watch has been maintained for a recurrence of myiasis produced by *Wohlfahrtia vigil*, particularly in young foxes and mink. No serious recurrence of enzootics caused by this parasite has been reported in Ontario for several years.

Requests for information in the control of Wohlfahrtia spp. were received from other provinces where the flies were causing considerable damage. Plans of the fly-proof nest boxes, developed in the past by this department, were forwarded to those concerned, and the recommendation made that synthetic residual insecticides be used on the woodwork and wire of the pens.

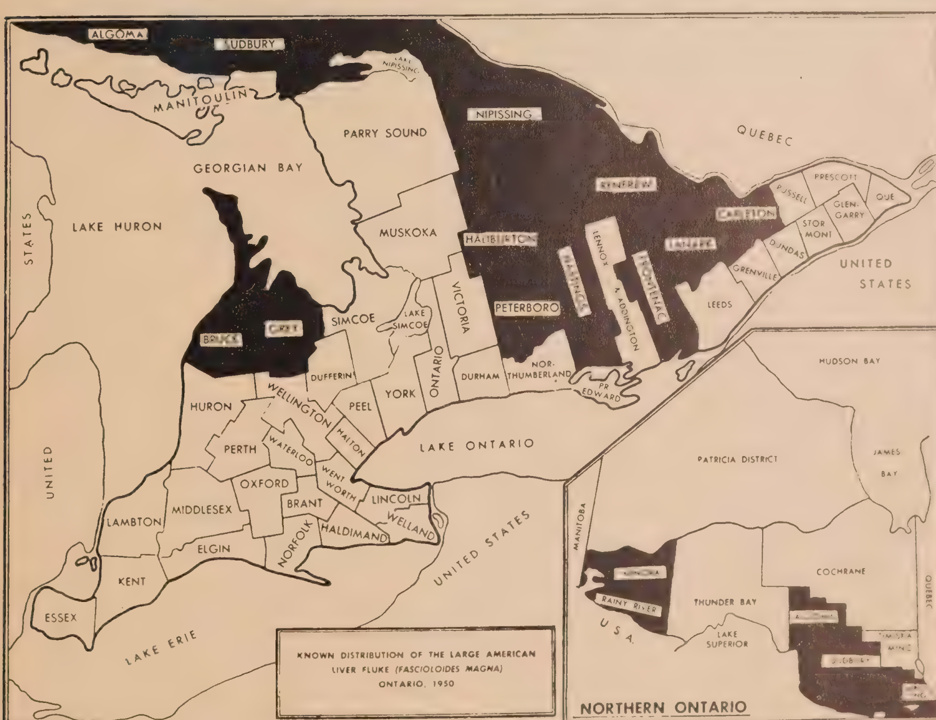
HELMINTHOLOGY

Our special projects concerning the control of liver rot in cattle, of sheep parasites, and of ascariasis in swine, were continued during the year. Routine laboratory work consisted of the examination of faecal samples for the presence of worm ova or larvae, and the identification of cestodes, nematodes, and miscellaneous helminths.

Liver Fluke Control in the Burwash Area

The programme to eradicate liver flukes in cattle and sheep of the Burwash area in the District of Sudbury has been continued annually since 1946. For the second year in succession, no damage has been caused by the parasites in domestic animals. The flukes *(Fascioloides magna)* have been prevented from infesting livestock by the destruction of the snail carriers of the disease and the careful selection of hay from uncontaminated sources.

The continued use of copper sulphate in the streams, applied in accordance with the Australian methods recommended by Clunies, Ross and Gordon, has proved effective in keeping snail populations reduced. In addition, bags of the chemical were placed at stream heads and in other places (inaccessible during the summer months) when the ground was still frozen. Copper sulphate was dusted also on the snow on the banks of a ravine where difficulty had been previously encountered in eradicating snails. Treating flood waters was again practised to destroy amphibious snails as far up on the banks as possible. Summer



(Original)

Fig. 5. LIVER FLUKE SURVEY, 1949. THE SHADED AREAS INDICATE COUNTIES OR DISTRICTS IN WHICH THE LARGE AMERICAN LIVER FLUKE *(Fascioloides magna)* IS KNOWN TO PARASITIZE WILD OR DOMESTIC RUMINANTS.

(Photograph by O.A.C. Extension Department)

Fig. 6. A COLLECTION OF LARGE AMERICAN LIVER FLUKES *(Fascioloides magna)* REMOVED FROM RUMINANTS. THESE PARASITES CAUSE EXTENSIVE DESTRUCTION OF LIVER TISSUE IN CATTLE AND SHEEP.

applications of the copper sulphate were used to destroy young snails which might have escaped destruction in the egg stage during the spring treatments.

The chemical, as described above, was used on the snow and frozen ground to ascertain if such a procedure would destroy the over-wintering snail populations. No snails could be located during the following summer in the ravine which was treated in this manner.

Pembroke Enzootic of Liver Fluke Disease

Elk which had been enclosed a number of years in a small area on the banks of the Ottawa River commenced to die during the winter of 1948-49. Autopsies revealed unusually heavy infestations of *Fascioloides magna.* Particular significance was attached to this enzootic as the flood waters of the Ottawa River inundated the pastures over which the infested animals grazed, thus creating the danger of the parasites becoming disseminated along the natural drainage systems of eastern Canada. To check any further spread of the disease to wild and domestic animals, recommendations were made to the Fish and Wild Life Division of the Department of Lands and Forests, to eradicate this particular elk herd. These recommendations were acted upon. The livers of all animals slaughtered were examined. The organs were extensively damaged, and all those from adults contained numerous parasites numbering up to 176 in a single liver. Young animals were not as heavily infested as the adults.

(Photograph by O.A.C. Extension Department)

Fig. 7. A cyst in the liver of an elk caused by two flukes *(Fascioloides magna)*. Limited numbers of flukes in the deer and elk do not usually cause the extensive damage observed in domestic ruminants.

Survey to Ascertain the Geographical Distribution of the Large American Liver Fluke *(Fascioloides magna)* in Ontario

In view of the enzootics encountered above, plans were made to ascertain the geographical range of *F. magna* in Ontario. A field survey was made in the summer of 1949. This survey was conducted jointly with personnel of the Department of Lands and Forests. Flukes were found to exist in 11 counties or districts, after a total of 16, including 42 townships, had been checked.

Detailed recommendations regarding the control of liver fluke disease have been prepared, and together with a report of the survey are pending publication.

Studies of Intermediate Hosts of Trematodes

As part of the preparation for controlling any serious outbreaks of liver fluke disease, and as a basic research project, work has been commenced to catalogue and record the distribution of the snail fauna of Ontario. This work is being conducted jointly by Mr. B. M. McCraw, assistant professor of parasitology at this College, and Dr. J. G. Oughton, professor of entomology and zoology at the Ontario Agricultural College. The Royal Ontario Museum has courteously made available for study extensive mollusc collections. In addition, members of the Department have collected an estimated 500,000 snails in various parts of the Province during the past year.

Experiments to Ascertain the Molluscacidal Value of Delta Isomer of Benzene Hexachloride in Controlling Intermediate Hosts of Trematodes

Using the delta isomer of benzene hexachloride as a molluscacide, Halawani (1947) in Egypt obtained good results experimentally against snails of the genera *Physa, Bulinus* and *Planorbis.* His studies were initiated as a control measure against snails which are intermediate hosts for schistosome infections in that country. In view of his success, experiments were carried out using similar dilutions of the compound under conditions as closely approximating those of Halawani's as possible to ascertain if this chemical is effective against snails indigenous to Ontario.

In vitro results showed that 24-hour exposure of snails of the genera *Helisoma, Fossaria* and *Physa* to 2.5, 5.0, 10.0, and 20.0 ppm delta isomer of benzene hexachloride resulted in partial or complete paralysis of all snails. On transfer to fresh water, 94 per cent showed complete revival after 12 hours indicating that this compound does not show promise as a potential molluscacide under conditions of experiment. However, as the chemical in question is claimed to be nonlethal to game fish, field trials will be made to gain further data on its value under natural conditions.

MYCOLOGY

Routine examinations, chiefly of skin scrapings, have been made for the presence of ringworm and other diseases caused by plant parasites. In cases where positive diagnoses were made, recommendations for control were given.

MISCELLANEOUS

RESEARCH GRANTS

The Department has received an extra-mural research grant for special projects which are being investigated.

EXHIBITIONS AND DEMONSTRATIONS

Exhibitions and special demonstrations were prepared for various groups of visitors to the College.

DEPARTMENTAL LIBRARY

During the year, progress has been made in the development of the Departmental Library through the acquisition of new textbooks, reprints, and bulletins.

DEPARTMENT OF PATHOLOGY

F. W. Schofield, D.V.Sc.

STAFF

The personnel of the Department of Pathology and their respective duties are as follows: Dr. F. W. Schofield, professor and head of the Department, lecturer in clinical pathology and in the history of medicine to the Fourth and Second Years, respectively, director and assistant in field investigations into obscure outbreaks of disease among animals; Dr. D. L. T. Smith, professor, lecturer in special pathology to the Third Year, in charge of the pathological laboratory diagnostic service, and assistant at autopsies; Dr. T. L. Jones, professor, lecturer in general pathology to the Second Year, assistant in the diagnostic service and at autopsies; Dr. J. D. Schroder, on leave of absence; and Mr. R. J. Humble, instructor in haematology to the Second Year. In addition, Dr. B. J. McSherry, who has been on loan from the Department of Anatomy, has rendered valuable service, especially in haematological diagnosis, and as laboratory instructor to the Third Year.

Miss Ruth Jordan, technician, resigned during the year. Her place has been ably filled by Mrs. Margaret Machell. Miss Shirley Bolster, in addition to carrying out the routine stenographic work, has prepared tables of statistics, two of which are included in this report.

The writer wishes to thank all members of the staff for their hearty co-operation and faithful work.

FACILITIES AND EQUIPMENT

The new and well-equipped post-mortem room, opened during the past year, provides increased facilities for teaching. The spacious refrigeration and other equipment have met a long-standing need in the Department.

During the year, many new specimens were added to the museum and numerous lantern slides prepared, all of which are invaluable for instructional purposes.

PATHOLOGICAL LABORATORY SERVICE

The routine diagnostic service includes clinical tests and post-mortem examinations. The number of specimens submitted for examination (see Table I) has more than doubled during the last two years. This is chiefly due to a growing recognition among the members of the veterinary profession of the significance of a laboratory report in making an accurate diagnosis.

TABLE I
ROUTINE DIAGNOSTIC SERVICE

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Alimentary System															
Enteritis—acute	....	....	8	1	1	23	2	1	1	1	....	1	....	1	40
Enteritis—chronic	....	....	....	....	....	1	....	1	1	....	....	....	....	....	3
Enteritis—gastro	....	....	1	....	....	8	1	....	....	....	....	....	....	....	10
Enteritis—subacute	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Enterotoxaemia	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Alimentary System—Continued															
Foreign body in gum							1								1
Gastric haemorrhage						1									1
Gastric impaction						3									3
Gastric ulcer							1								1
Gastritis—acute			1			1	2								4
Gastritis—chronic							1								1
Gastritis—ulcerative						1									1
Glossitis (plant thorn)							2								2
Hernia—perineal							2								2
Impaction (colon)			1												1
Impaction (ileum)								1							1
Metastatic calcification (stomach)							1								1
Mucous cyst (salivary gland)			1												1
Peritonitis			1	1		2	3	1			2			1	11
Rupture of colon						1									1
Stomatitis—necrotic							1								1
Ulceration (ileum)						1		1							2
Ulceration (pharynx)			1												1
LIVER															
Abscess			2								1				3
Abscess and cyst formation		1													1
Abscess—miliary		1													1
Actinomycosis			1												1
Atrophy						1									1
Cholecystitis													1		1
Cirrhosis			1		1										2
Cirrhosis—focal						2									2
Cirrhosis—portal							2								2
Congenital melanosis			1												1
Congestion—passive					1										1
Degeneration—albuminous			1				1	1							3
Degeneration—fatty			1	2		1	2				1		1	1	9
Fibrosis (gallbladder)						1									1
Haemorrhage			2												2
Hepatitis—acute			2			1	1						1		5
Hepatitis—chronic			2											1	3
Hepatitis—focal		1	1					1	1						4
Hypertrophy						1									1
Infarction			1												1
Infiltration—fatty											2		1	1	4
Necrosis			1				1	1				1		2	6
Necrosis—focal						1	1	1							3
Necrosis and telangiectasis			1												1
Parasitic infestation						1									1
Rupture				1											1
PANCREAS															
Pancreatitis—chronic							1								1
Blood and Blood-Forming Organs															
Agranulocytosis								1							1
Anaemia						4	2								6
Anaemia and infection			2		1		1								4

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Blood and Blood-Forming Organs—Continued															
Anaemia and lymphocytosis	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2
Anaemia and neutrophilia	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Congestion (spleen)	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
Leucocytosis	....	....	2	....	....	....	2	....	....	....	....	....	....	....	4
Leukopenia	....	....	....	....	....	....	5	....	....	....	....	....	....	....	5
Lymphadenitis—caseous	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Lymphadenitis—chronic	....	....	1	....	....	1	....	....	....	....	....	....	....	....	2
Lymphadenitis—haemorrhagic	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Lymphadenitis—suppurative	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Lymphocytoma	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Lymphocytomatosis	....	....	2	....	....	....	1	....	....	....	1	....	....	....	4
Monocytosis	....	....	1	....	....	....	....	....	....	....	2	....	....	....	3
Neutrophilia	....	....	7	....	....	....	64	....	....	....	....	....	....	....	71
Normal (blood)	....	....	7	2	2	....	19	....	2	....	....	....	....	....	32
Pyaemia	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Rupture (spleen)	....	....	1	....	....	....	3	1	....	....	....	....	....	....	5
Septic spleen	....	....	....	....	....	1	2	....	....	....	....	1	....	....	4
Splenitis	....	....	....	....	....	....	2	....	....	....	....	....	....	2	4
Musculoskeletal System															
Abscess	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2
Arthritis—acute	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Arthritis—chronic	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Calcification (tendon)	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Degeneration	....	....	....	....	....	....	....	....	....	....	....	....	1	1	2
Exostosis (ribs)	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Granuloma	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Myositis	....	....	....	....	1	....	2	....	....	....	....	....	....	....	3
Necrosis	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
Skin															
Abscess	....	....	3	....	1	1	2	....	....	....	1	....	....	....	8
Alopecia	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Cyst—dermoid	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Cyst—keratin	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Cyst—sebaceous	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2
Dermatitis—acute	....	....	1	....	1	1	....	2	....	....	....	....	....	....	5
Dermatitis—chronic	....	....	3	....	1	....	9	1	....	....	....	....	1	....	15
Granulation tissue	....	....	2	....	3	....	13	....	....	....	....	....	....	....	18
Hyperkeratosis	....	....	3	....	....	1	1	....	....	....	....	....	....	....	5
Infection (conjunctiva)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Inflammatory tissue—acute	....	....	....	....	....	....	2	2	....	....	....	....	....	....	4
Invagination (skin)	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Ingrown hairs	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2
Metastatic calcification	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Polypus	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Pruritis	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Pustules (skin)	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Ulcer (lip)	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Genital System															
Adenomyosis (uterus)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Cryptorchid (testicle)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Cystic ovaries	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Degeneration (testicle)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Endometritis	....	....	1	....	....	....	....	....	1	....	....	....	....	....	2
Endometritis—chronic	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Endometritis with abortion	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Granuloma (testicle)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Granuloma—chronic (sheath)	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Granular vaginitis	....	....	22	....	....	....	....	....	....	....	....	....	....	....	22
Hyperplasia—cystic (mammary gland)	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Hyperplasia—endometrial	....	....	1	....	....	....	1	....	....	....	....	....	....	....	2
Hypertrophy (prostate)	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2
Intercaruncular placentation	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Metritis	....	....	....	....	....	....	1	....	....	1	....	....	....	....	2
Normal (testicle)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Orchitis—chronic	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2
Orchitis—traumatic	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Oestrus	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Salpingitis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Urinary System															
Abscess (kidney)	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
Calculi—cystic	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
Congenital hypoplasia (kidney)	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Cystitis—acute	....	1	....	....	....	....	2	....	....	....	....	....	....	....	3
Cystitis—chronic	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2
Cystitis—ulcerative	....	....	....	....	....	....	1	....	....	....	....	....	1	....	2
Degeneration (kidney)	....	....	....	....	....	....	1	....	....	1	....	....	....	....	2
Glomerulonephritis	....	....	....	....	1	....	....	1	1	....	....	....	....	....	3
Haematuria	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Haemoglobinuria	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Infarction (kidney)	....	....	....	1	....	....	....	1	....	....	....	....	....	....	2
Nephritis	....	....	....	....	....	....	1	....	....	....	1	....	....	1	3
Nephritis and cystitis	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Nephritis—chronic	....	1	2	....	....	....	8	....	....	1	....	....	....	....	12
Nephritis—subacute	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Nephritis—suppurative	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
Nephrosis with fibrosis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Nephrosis—lipoid	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Nephrosis—toxic	....	....	....	....	....	4	1	1	....	....	....	2	1	1	10
Pyelonephritis	....	....	4	....	....	1	1	....	....	....	....	....	....	1	7
Heart and Circulatory System															
Arteritis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Arteritis—verminous	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Congenital deviation of septum (heart)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Cysticercus bovis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Haematoma	....	....	1	....	....	....	1	....	....	....	....	....	....	....	2

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Heart and Circulatory System—Continued															
Myocarditis—bacterial			3				1								4
Myocarditis—chronic			1												1
Myocarditis—toxic			1												1
Myocardial degeneration							1								1
Myocardial necrosis			1												1
Pericarditis							1			1					2
Pericarditis—traumatic			2												2
Nervous System															
Aplasia (cerebellum)			1												1
Degeneration (brain)			2												2
Encephalitis				1		1	17								19
Encephalitis—toxic							1								1
Encephalitis—virus							15								15
Encephalitis—virus, and pneumonia							1								1
Granuloma							1								1
Meningo-encephalitis			1			1	2								4
Meningitis							1								1
Meningitis—acute			1												1
Respiratory System															
TRACHEA															
Tracheitis—diphtheritic			1												1
Tracheitis—haemorrhagic										1					1
BRONCHI															
Bronchiectasis			4												4
Bronchitis—chronic							1								1
LUNGS															
Congestion—acute						1	1				1				3
Congestion—chronic passive						1	1								2
Emphysema			1												1
Fibrosis			1		1										2
Granuloma				1											1
Inflammation (air sac)											1				1
Oedema						1	2						1		4
Oedema and congestion			1				1								2
Pulmonary pigmentation														1	1
Metastatic calcification							1								1
Pneumonia—acute			1			2									3
Pneumonia—broncho			5	3		11	5	1							25
Pneumonia—caseous						1									1
Pneumonia—chronic						2	1								3
Pneumonia—gangrenous					1										1
Pneumonia—interstitial						1									1
Pneumonia—lobar			10	2	1	2	3					2			20
Pneumonia—lobular						2									2

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Respiratory System—Continued															
LUNGS															
Pneumonia—mechanical	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Pneumonia—mycotic	....	2	....	....	....	....	2	....	....	....	3	....	....	....	7
Pneumonia—pleuro	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Pneumonia—subacute	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Pneumonia—suppurative	....	....	7	....	....	2	1	....	....	....	....	....	....	....	10
Pneumonia—verminous	....	....	....	....	....	2	....	....	....	....	....	....	....	....	2
Pneumonia—miscellaneous	....	2	3	1	....	15	10	1	1	....	1	2	....	1	37
Thrombosis and infarction	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
NASAL PASSAGE															
Phlegmon (nose)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Bones and Joints															
Osteo-arthropathy	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Osteodystrophia fibrosa	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Sequestration (scapula)	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Spondylitis	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Developmental Abnormalities															
Chondrodystrophia foetalis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Neoplasms															
CONNECTIVE TISSUE—BENIGN															
Chondroma—fibro	....	....	....	....	....	....	3	....	....	....	....	....	....	....	3
Fibroma	....	....	4	....	....	....	4	....	....	1	....	....	....	....	9
Fibroma (anidean)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Fibroma—chondro	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Fibroma—cystadeno	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Fibroma—neuro	....	....	....	....	....	....	1	....	....	....	1	....	....	....	2
Fibroma—osteo	....	....	....	....	....	....	1	....	....	....	....	1	....	....	2
Leiomyoma	....	....	....	....	....	1	3	....	....	....	....	....	....	....	4
Lipoma	....	....	4	....	....	....	4	....	....	....	....	....	....	....	8
Lipoma—fibro	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
CONNECTIVE TISSUE—MALIGNANT															
Osteoclastoma	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Sarcoma—fibro	....	....	1	....	3	....	12	1	....	....	....	....	....	....	17
Sarcoma—lympho	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Sarcoma—osteogenic	....	....	....	....	2	....	....	....	....	....	....	....	....	....	2
Sarcoma—round cell	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Sarcoma—reticulum cell	....	....	....	....	....	1	8	....	....	....	....	....	....	....	9
EPITHELIUM—BENIGN															
Adenoma	....	....	....	....	....	....	4	....	....	1	1	....	....	....	6
Adenoma—cyst	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Adenoma—fibro	....	....	....	....	....	....	3	....	....	....	....	....	....	....	3
Adenoma—papillary	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Neoplasms—Continued															
EPITHELIUM—BENIGN															
Adenoma—sebaceous gland							6								6
Cystadenoma—serous						1	1								2
Feather follicle											1				1
Papilloma	1		1				4				1				7
Papilloma—keratotic	1														1
EPITHELIUM—MALIGNANT															
Carcinoma			2			1	11	1			1				16
Carcinoma—adeno							15				1				16
Carcinoma—adeno papillary		1	2												3
Carcinoma—adrenal			3												3
Carcinoma—basal cell			1				2	1							4
Carcinoma—epidermoid							8								8
Carcinoma—hair matrix								1							1
Carcinoma—papillary cyst adeno							1								1
Carcinoma—scirrhous			1												1
Carcinoma—sebaceous cell							1	2							3
Carcinoma—squamous cell			2												2
Cholangioma							1								1
Dysgerminoma			1												1
Hepatoma			2	1											3
Seminoma							2								2
ANGIOMATA															
Haemangioma—cavernous							1								1
HAEMOPOIETIC TISSUE—MALIGNANT															
Erythroleucosis											1				1
Leukaemia								1							1
Lymphocytoma			7			3	5	1			1				17
Lymphomatosis											1				1
Plasmacytoma			1				1								2
Thymoma—malignant			1												1
PIGMENTED NEOPLASMS															
Melanoma—benign							1								1
Melanoma—malignant			1	2			3	1							7
NERVOUS SYSTEM															
Neuroma—benign					1										1
TERATOMAS															
Dentigerous cyst			1												1
Embryonal nephroma			1			4					1				6
Teratoma			2												2
SPECIAL NEOPLASMS															
Mesothelioma			1								1				2

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Special Diseases															
Abortion			1		4										5
Abortion—contagious			1												1
Abortion—vibrionic			1												1
Acanthosis nigricans							1								1
Acetonaemia			1												1
Actinobacillosis			4												4
Actinomycosis			2			1									3
Agalactia						2									2
Anaphylaxis						1									1
Anaemia—nutritional						4									4
Blackhead											1				1
Blackleg			1												1
Bloat			1												1
Cachexia						1									1
Cardiac failure							2								2
Cardiac insufficiency							1								1
Cellulitis							1								1
Coccidiosis									1						1
Coligranuloma												1			1
Colon septicaemia		1			1	2									4
Corynebacterium infection						1									1
Dietary deficiency			1			3					1		2		7
Diffuse colloid goitre			1												1
Distemper		2					23						2		27
Distomatosis		1											1		2
Ecchynococcus cyst		1													1
Emaciation		2				3	1								6
Encephalomalacia											1				1
Enteritis—necrotic						12									12
Enteritis—virus									1				1		2
Enteritis—vibrionic						1									1
Enterohepatitis											2				2
Epidemic tremor											1				1
Fascioliasis		1													1
Feline enteritis								10							10
Hard pad disease							2								2
Heat prostration						1									1
Indigestion							1								1
Infection—*Bacterium coli*											1				1
Infection—*Klebsiella pneumoniae*						2									2
Infection—Leptospira							1								1
Infection—*Bacillus necrophorus*			2												2
Infection—paracolon						2									2
Infectious canine hepatitis							18								18
Johne's disease			3												3
Listerellosis			2						1				2		5
Listerellosis—experimental									1						1
Malnutrition						1	1								2
Mastitis—acute			9												9
Mastitis—chronic			4												4
Mastitis—suppurative			3			1									4

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Special Diseases—Continued															
Mummified foetus			1												1
Newcastle disease											3				3
Nodular venereal disease			2												2
Nutritional deficiency									2						2
Oesophagostomiasis				3											3
Overdose—iron						2									2
Parasitic abscess						1									1
Parasitic infestation		1	3		2	6	1				1				14
Parasitic endocarditis				1											1
Pasteurellosis						2			3						5
Pulpy kidney disease				1											1
Pregnancy disease				6			1								7
Rhinitis						7	2		1						10
Salmonellosis						4									4
Sarcosporidiosis			1												1
Scrapie				1											1
Septicaemia		3	10	3	5	18	9	1	1			2	3	4	59
Septicaemia—haemorrhagic			1			3									4
Septicaemia neonatorium			3												3
Septicaemia—Salmonella						1									1
Serositis						12									12
Shock							2								2
Snuffles									1						1
Steatitis													2		2
Sterility			1												1
Stiff lamb disease				1											1
Streptococcus						1	3								4
Sudden death			5												5
Swamp fever					1										1
Swine erysipelas						5									5
Swine influenza						1									1
Tapeworm infestation							1								1
Toxaemia		2	8	1	1	2	11		1			1	5	5	37
Toxoplasmosis		1				1	1		1						4
Tuberculosis			8	2		2				1	1				14
Trauma							3	1				1			5
Virus "X" disease							1								1
Vitamin A deficiency													1		1
Vitamin B deficiency						2									2
Vitamin C deficiency						1				1					2
Whipworm infestation							1								1
Poisons															
Algae poisoning			1						1						2
Antu poisoning							4								4
Arsenic poisoning			2												2
Cerosan poisoning						1									1
Lead poisoning			2			1									3
Oxalic acid poisoning									1						1
Phosphorus poisoning							1								1
Rape poisoning			2												2
Sulpha poisoning			1				2								3
Unidentified poisoning					2	2	2	2							8

DISEASE	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	TOTAL
Normal	....	....	17	....	....	....	18	4	....	....	2	....	....	....	41
Negative (No Poison Detected)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
No Pathognomonic Lesions	....	2	31	3	11	22	42	4	1	2	5	2	6	8	139
Post-Mortem Change	....	1	5	1	....	3	7	....	....	....	2	....	....	....	19
TOTALS	2	29	358	44	54	269	538	56	25	14	50	19	35	35	1,528

TABLE II

SUMMARY OF SPECIES AND NUMBER OF SPECIMENS

1945 - 1950

	HUMAN	WILD SPECIES	CATTLE	SHEEP	HORSES	SWINE	DOGS	CATS	RABBITS	GUINEA PIGS	BIRDS	FOXES	MINK	CHINCHILLA	MUSEUM SPECIMENS	TOTAL
1945 - 1946	....	....	141	12	32	36	179	11	10	....	16	7	3	1	....	448
1946 - 1947	....	5	199	10	55	67	135	30	10	11	45	39	84	7	....	697
1947 - 1948	....	17	198	20	37	143	207	15	9	6	26	28	59	2	....	767
1948 - 1949	2	30	230	32	71	170	275	33	14	4	60	12	59	13	6	1,011
1949 - 1950	2	29	358	44	54	269	538	56	25	14	50	19	35	35	....	1,528

DEPARTMENT OF PHYSIOLOGY AND CLINICAL CHEMISTRY

H. T. Batt, M.V.Sc., M.S., D.V.Sc., Ph.D., Certificat de l'Ecole Veterinaire d'Alfort (France)

The work of this department is concerned with teaching the physiology of domestic animals, and with teaching the clinical chemistry of domestic animals, to undergraduate students in the Ontario Veterinary College and in the Ontario Agricultural College. Some investigational work is also done, but this, at present, is subsidiary to the instructional work.

The personnel of the Department of Physiology and Clinical Chemistry and allocation of the work is as follows: H. T. Batt—professor and head of the Department, instructor in physiology of domestic animals to veterinary students and agricultural students, instructor in clinical chemistry of domestic animals to veterinary students, and director of investigational work in research in connection with the functioning of the healthy and diseased animal body; H. G. Downie—instructor in physiology of domestic animals, (on leave of absence).

As indicated above, Dr. H. G. Downie has been on leave of absence during the past fiscal year. His absence has led to some curtailment of the departmental work. However, the specialized training he is receiving in the course of his postgraduate studies will be of benefit to the Department and will more than compensate for any temporary disadvantages resulting from his absence.

A most gratifying development of the year under review has been the marked increase in the number of graduate students who have selected Physiology as a subject for their postgraduate study and have taken special work in this department as part of a prescribed course for a Master's degree.

INSTRUCTION

The total teaching load of this department during the past year consisted of the delivery of 174 one-hour lectures, the preparation and supervision of eight demonstration periods, the setting and holding of 10 examinations, and the marking of 892 examination papers. This load was distributed as follows:

PHYSIOLOGY

The Second Year class of the Ontario Veterinary College, numbering 104 students, received 75 one-hour lectures, making a total of 7,800 student-lecture hours and several demonstrations. Four examinations were held during the course of instruction.

The Animal Husbandry and Poultry Options, in the Third Year class of the Ontario Agricultural College, numbering 58 students, received 58 one-hour lectures, making a total of 3,364 student-lecture hours. Four examinations were held during the course of instruction and numerous demonstrations were given.

The teaching schedule for physiology thus included the delivery of 133 one-hour lectures, the preparation of and supervision of many demonstration periods, the holding of seven examinations and the marking of 580 examination papers.

CLINICAL CHEMISTRY

The Second Year class of the Ontario Veterinary College, numbering 104 students, received 41 one-hour lectures, making a total of 4,264 student-lecture hours. Three examinations were held during the course of instruction.

The teaching schedule in clinical chemistry thus included the delivery of 41 one-hour lectures, the holding of three examinations and the marking of 312 examination papers.

DEMONSTRATIONS

Throughout the year a series of demonstrations has been perfected to supplement the lecture course given the veterinary and agricultural students. During the post-war years, the teaching of physiology has been greatly modified and improved through the application of certain apparatus and techniques, developed during the war for military purposes, to classroom and laboratory instruction. The Department of Physiology and Clinical Chemistry was represented at a special course for research workers in this field given last summer at Cornell University, Ithaca, New York, U.S.A.

At present, much of the available time of this department is devoted to such work — that is, research into new methods of preparation of suitable material and methods of presentation of such material in the classroom. The demonstrations took place in the demonstration area of the main laboratory. The following have been developed:

(a) A method of visually representing the heart sounds and action potentials has been made possible by means of a special large cathode ray oscilloscope. This oscilloscope, to be used especially on large animals, had been prepared by a well known research institute under the instructions of the Department. Difficulties met in grounding and shielding the apparatus were slowly overcome and we now have a method of visual instruction that is used in classroom work. Combined with the oscilloscope's operation, we can use our new direct-writing electrocardiograph to obtain heart action records.

(b) A special amplification system has been arranged by the Department whereby muscular action potentials can be changed to sound and demonstrated to the students.

(c) An electrodyne stimulator has been adapted to show nervous tetani after a series of tests to ascertain the voltage so that it could be used on a human subject.

(d) Various lens systems have been prepared to enlarge microscopic or opaque objects or fluid levels, so that their images can be transmitted to screens. Thus all students in our classes have an equal opportunity of seeing experiments that could otherwise be watched by only three or four. An example of this was the use of a new arc lamp and a series of lenses by which the Department was able to enlarge a section of frog's tongue to such a size that the circulation in the area could be observed on a large screen. After perfection, this method was finally used for student demonstrations.

(e) A cardiotachometer has been obtained and before it could be used correctly a series of adjustments had to be made. As with the oscilloscope, grounding and screening were inadequate and attempts to alleviate this difficulty are still in progress.

Several pieces of apparatus were added to the equipment of the Department during the past year. The most noteworthy of these were an ink-writing continuous feed Kymograph and a Warbourg apparatus for the study of tissue and cellular metabolism.

DEPARTMENT OF PREVENTIVE MEDICINE AND HYGIENE

A. F. Bain, D.V.M.

STAFF

Several changes have been made in the staff of the Department of Preventive Medicine and Hygiene during the past year. Two additions to the graduate personnel of the Department were Dr. C. G. Wills, who was appointed in June as Research Assistant, and Dr. Elizabeth Shambleau who joined the staff in September to assist with the increasing amount of diagnostic material handled. Dr. D. A. Barnum has continued on leave of absence to pursue graduate work.

The only change in the technical staff was the replacement of Mr. Charles Burnie by Mr. Oliver Scroggie, necessitated by Mr. Burnie's resignation in order to continue his university course.

Two student technicians were employed during the summer months and six students were employed on a part-time basis to assist in the preparation of laboratory material during the school year.

The heavy teaching load has necessitated many hours of overtime work and the writer is grateful to all those concerned for their continued cheerful co-operation.

TEACHING

The chief change in this part of the Department's work has been an increase in laboratory hours necessitated by the division of the Third Year class into two groups for laboratory bacteriology. This meant that the laboratory was in use for 14 hours each week during the fall term and for 16 hours each week during the spring term.

The teaching was handled as previously. Dr. A. F. Bain lectured in bacteriology to the Third and Fourth Years and planned and supervised the laboratory courses in bacteriology and immunology for both those years. A number of changes were made in the laboratory courses for the Fourth Year and changes are presently being made in the Third Year laboratory course.

Dr. N. A. Fish again taught the course in food hygiene and public health to the Fourth Year. The laboratory course in this subject was revised and is at present again being revised for the classes in 1950. In addition, Dr. Fish gave the lecture course in bacteriology to the Second Year, replacing Dr. Barnum as lecturer.

Mr. K. A. McKay continued to give the course in antibiotics to the Fourth Year class. The mounting discoveries in this branch of science have necessitated several complete revisions of both the lecture and laboratory courses, sometimes while the course was being given. At present, the course is being completely revised once more.

In addition to planning and supervising his own laboratory course, each instructor also assisted as a demonstrator in the other laboratory courses. One additional demonstrator, Dr. C. G. Wills, was also employed in research with another department of the College.

As in past years, several outside lecturers gave courses on subjects related to preventive medicine and hygiene. Dr. C. E. van Rooyen and Dr. A. J. Rhodes

of the Connaught Medical Research Laboratories, University of Toronto, gave a lecture-laboratory course in virology; Dr. J. M. Mather, Medical Health Officer, Halton County Health Unit, gave a lecture course in epidemiology and public health; and Dr. W. R. LeGrow, of the Department of Extension, Ontario Veterinary College, conducted a lecture course in reportable diseases.

DIAGNOSTIC SERVICES

The amount of material examined by the Department has gradually increased over a period of several years. During the past fiscal year, the amount of material submitted has increased so markedly that it was necessary to employ an extra graduate assistant during the academic year.

There has been no reduction in the number of specimens received for examination during the first few months immediately following the period covered in this report, and it is expected, therefore, that next year's report will show a similarly marked increase.

The following tables list the number and type of specimens examined and the results of the various cultural examinations.

BACTERIOLOGICAL SERVICES

NATURE OF SERVICE	NUMBER OF SPECIMENS
Examination of material from cattle	601
Examination of material from sheep	45
Examination of material from swine	430
Examination of material from horses	115
Examination of material from small animals (dogs and cats)	187
Examination of material from fur-bearing animals	210
Examination of material from birds	4
Examination of material from humans	27
Serology	234
Examination of feed samples	21
Examination of milk samples	73
Cultures for identification and sterility tests performed	38
Preparation of autogenous immunizing agents	110
TOTAL	2,095

CULTURES — RESULTS

CATTLE

MATERIAL EXAMINED	NEGATIVE	MICROCOCCUS PYOGENES	STREPTOCOCCI	CORYNEBACTERIUM	PASTEURELLA	COLON	CLOSTRIDIUM PERFRINGENS	CLOSTRIDIUM SEPTICUM	VIBRIO FOETUS	ACTINOMYCES	MISCELLANEOUS		TOTAL
Abomasum	5	1	4	....	....	2	....	....	....	....	....	....	12
Blood culture	9	....	....	....	....	....	....	....	....	....	....	....	9
Brain and spinal cord	13	....	1	2	....	1	....	....	....	....	*Listeria monocytogenes*	1	18
Cow's hoof	....	1	1	....	....	....	....	....	....	1	....	....	3
Exudate from cartilege of calf	....	....	1	....	....	....	....	....	....	....	....	....	1
Faeces and rectal scrapings	7	....	1	....	....	13	....	....	....	1	*Mycobacterium tuberculosis*	4	26

Material Examined	Negative	Micrococcus Pyogenes	Streptococci	Corynebacterium	Pasteurella	Colon	Clostridium Perfringens	Clostridium Septicum	Vibrio Foetus	Actinomyces	Miscellaneous		Total
Foetus and foetal membranes	26	....	....	....	....	....	....	....	3	....	*Brucella abortus*	10	
											Trichomonas foetus	1	40
Genito-urinary tract	17	....	5	4	....	4	2	....	....	1	*Mycobacterium tuberculosis*	2	
											Klebsiella	1	36
Intestinal tract	23	2	7	....	....	21	4	....	....	4	Klebsiella	3	
											Pseudomonas aeruginosa	1	
											Vibrio jejuni	1	
											Mycobacterium paratuberculosis	3	69
Joint	1	....	....	2	....	....	....	....	....	1	....	....	4
Liver	12	....	4	2	....	2	....	....	....	6	Alcaligenes	1	27
Lung	30	3	16	15	16	14	2	....	....	2	*Pseudomonas aeruginosa*	2	
											Klebsiella	2	
											Mycobacterium tuberculosis	1	
											Alcaligenes	1	
											Pasteurella pseudotuberculosis	1	
											Brucella bronchiseptica	2	107
Lymph glands	6	....	....	1	....	1	....	....	....	....	*Actinobacillus lignieresi*	1	
											Mycobacterium paratuberculosis	1	
											Pasteurella pseudotuberculosis	1	
											Mycobacterium tuberculosis	2	13
Milk	2	1	9	1	....	....	....	....	....	....	....	....	13
Miscellaneous swabs	22	9	26	10	1	8	....	....	....	1	*Pseudomonas aeruginosa*	6	
											Pasteurella haemolytica	1	84
Mouth and jaw	....	....	....	....	....	....	....	....	....	1	*Actinobacillus lignieresi*	1	2
Muscle tissue	13	....	....	....	....	....	1	1	....	....	....	....	15
Nasal exudate	1	1	1	2	1	....	....	....	....	1	*Actinobacillus lignieresi*	1	8
New growths and abscesses	2	....	2	2	....	1	....	....	....	5	....	....	12
Peritoneal fluid	1	....	2	....	1	1	....	....	....	....	....	....	5
Semen	10	2	5	5	....	3	....	....	....	....	*Pseudomonas aeruginosa*	1	26
Skin	1	....	....	....	....	....	....	....	....	....	....		1
Spleen	22	....	4	1	....	7	....	....	....	....	....		34
Udder	....	....	1	1	....	....	....	....	....	....	....		2
Urine	9	2	7	13	....	3	....	....	....	....	....		34
Totals	232	22	97	61	19	81	9	1	3	24		52	601

SHEEP

MATERIAL EXAMINED	NEGATIVE	STREPTOCOCCI	CORYNEBACTERIUM	PASTEURELLA	CLOSTRIDIUM PERFRINGENS	MISCELLANEOUS		TOTAL
Brain	3	....	....	....	....	....	....	3
Foetus	2	....	....	....	....	....	....	2
Genital tract	2	....	....	....	....	....	....	2
Intestinal tract	1	....	....	....	8	Haemolytic colon	1	10
Kidney	1	....	....	....	3	....	....	4
Liver	1	....	....	....	....	....	....	1
Lung	4	2	1	5	1	*Pasteurella pseudotuberculosis*	1	
						Klebsiella	3	17
Lymph glands	2	....	1	....	....	....	....	3
Muscle tissue	....	....	....	....	....	*Clostridium septicum*	1	1
Spleen	1	....	....	....	1	....	....	2
TOTALS	17	2	2	5	13		6	45

SWINE

MATERIAL EXAMINED	NEGATIVE	ERYSIPELOTHRIX	STREPTOCOCCI	CORYNEBACTERIUM	PASTEURELLA	COLON	NECROPHORUS	SALMONELLA	MISCELLANEOUS		TOTAL
Blood	5	....	....	....	....	....	....	....	*Pasteurella haemolytica*	1	6
Brain	2	....	....	1	....	....	....	....	*Pseudomonas aeruginosa*	1	4
Foeti	5	....	....	....	1	....	....	....	....	....	6
Intestinal tract	22	....	6	1	....	26	8	2	Klebsiella	11	
									Clostridium perfringens	3	
									Alcaligenes faecalis	1	
									Vibrio	1	
									Paracolon	1	82
Joint	3	....	1	1	....	....	....	....	Paracolon	1	6
Kidney	12	2	1	1	....	9	....	....	*Clostridium perfringens*	2	
									Klebsiella	1	
									Paracolon	1	29
Liver	6	1	1	....	1	5	1	....	....	....	15

MATERIAL EXAMINED	NEGATIVE	ERYSIPELOTHRIX	STREPTOCOCCI	CORYNEBACTERIUM	PASTEURELLA	COLON	NECROPHORUS	SALMONELLA	MISCELLANEOUS		TOTAL
Lung	45	1	35	24	46	16	1	2	*Pasteurella haemolytica*	1	
									Brucella bronchiseptica	8	
									Klebsiella	4	
									Pseudomonas aeruginosa	3	
									Haemophilus influenzae suis	7	
									Paracolon	5	
									Corynebacterium equi	2	
									Alcaligenes faecalis	1	
									Clostridium perfringens	2	203
Lymph glands	8	1	....	....	....	....	....	....	....	....	9
Miscellaneous swabs	....	....	1	1	....	....	1	....	....	....	3
Nasal chambers	1	....	1	....	4	1	1	....	*Haemophilus influenzae suis*	1	9
Oesophagus	....	....	1	....	....	1	....	....	....	....	2
Pericardial fluid	2	....	....	2	....	1	....	....	*Micrococcus pyogenes var. aureus*	1	6
Pleural abscess	....	....	....	1	....	....	....	....	....	....	1
Skin	1	....	1	....	....	....	....	....	....	....	2
Spleen	26	2	3	1	....	10	....	....	Klebsiella	3	
									Clostridium perfringens	1	46
Testicle	1	....	....	....	....	....	....	....	....	....	1
TOTALS	139	7	51	33	52	69	12	4		63	430

HORSES

MATERIAL EXAMINED	NEGATIVE	STREPTOCOCCI	COLON	CORYNEBACTERIUM	MISCELLANEOUS		TOTAL
Abdominal fluid	1	....	....	....	....	....	1
Blood	3	1	....	....	....	....	4
Bone	....	1	....	....	....	....	1
Faeces	1	....	....	....	....	....	1
Fluid from jaw	....	1	....	....	....	....	1
Foetus and foetal membranes	7	2	1	....	....	....	10
Intestinal tract	1	....	....	....	....	....	1
Joints	....	2	....	....	....	....	2
Kidney	3	1	....	....	....	....	4
Liver	1	1	....	....	....	....	2
Lungs	3	1	....	....	....	....	4
Milk	2	....	....	....	....		2
Spleen	3	1	....	....	....	....	4
Stomach	....	1	....	....	....	....	1
Swabs—fistula	1	1	....	....	Streptococcus	1	
					Brucella abortus	1	4
—genital tract	27	22	9	5	....	....	63
—nasal	2	1	....	....	....	....	3
—skin	1	....	....	....	....	....	1
Urine	1	....	1	....	....	....	2
Uterus	....	4	....	....	....	....	4
TOTALS	57	40	11	5		2	115

SMALL ANIMALS

MATERIAL EXAMINED	NEGATIVE	MICROCOCCUS PYOGENES	STREPTOCOCCI	COLON	BRUCELLA BRONCHISEPTICA	KLEBSIELLA	MISCELLANEOUS		TOTAL
Bladder	....	....	....	1	....	....		....	1
Brain	1	....	....	....	1	....		....	2
Discharge from fistula	1	....	....	....	....	....	Clostridia	1	2
Faeces	1	....	....	....	....	....		....	1
Gall bladder	....	....	1	....	....	....		....	1
Heart blood	5	....	1	....	....	....		....	6
Heart muscle	....	....	....	1	....	....		....	1
Intestinal tract	16	....	1	2	....	....		....	19
Kidney—urine	3	....	....	2	....	....		....	5
Liver	3	....	2	3	....	....		....	8
Lungs	10	1	5	1	5	1	*Pseudomonas aeruginosa*	1	
							Paracolon	1	25
Lymph gland	....	....	1	1	....	....		....	2
Milk sample	2	....	....	....	....	....		....	2
Miscellaneous swabs	19	15	21	6	2	8	*Clostridium perfringens*	1	
							Corynebacterium	1	
							Paracolon	1	74
Peritoneal fluid	2	....	1	....	....	....		....	3
Prostate	1	....	1	....	....	....		....	2
Skin scraping	2	2	2	....	....	....	Corynebacterium	1	
							Blastomycosis	1	8
Spinal fluid	2	....	....	....	....	....		....	2
Spleen	4	....	4	2	....	....		....	10
Urine (dark field)	10	....	....	....	....	....	Leptospirosis	3	13
TOTALS	82	18	40	19	8	9		11	187

FUR-BEARING ANIMALS*

MATERIAL EXAMINED	NEGATIVE	MICROCOCCUS PYOGENES	STREPTOCOCCI	COLON	KLEBSIELLA	PASTEURELLA MULTOCIDA	PROTEUS	GRAM-POSITIVE DIPHTHEROID RODS	MISCELLANEOUS		TOTAL
Bladder and urine	11	1	....	1	....	....	1	....		....	14
Blood	8	....	....	....	....	....	....	....	*Brucella abortus*	1	9
Bone marrow	16	....	....	....	....	....	....	7		....	23
Brain	1	....	....	....	....	....	....	....	*Listeria monocytogenes*	1	2
Faeces	10	....	....	....	....	....	....	....		....	10
Heart	....	1	....	....	....	....	....	....		....	1
Intestinal tract	20	....	6	4	4	....	5	....	Paracolon	2	
									Shigella	1	42
Jaw	1	....	....	....	....	....	....	....		....	1
Kidney	16	....	1	....	....	....	1	....	*Corynebacterium pyogenes*	1	19

MATERIAL EXAMINED	NEGATIVE	MICROCOCCUS PYOGENES	STREPTOCOCCI	COLON	KLEBSIELLA	PASTEURELLA MULTOCIDA	PROTEUS	GRAM-POSITIVE DIPHTHEROID RODS	MISCELLANEOUS		TOTAL
Liver	7	....	4	....	1	....	1	....	*Listeria monocytogenes*	2	
									Shigella	2	
									Corynebacterium pyogenes	2	19
Lungs	13	1	5	....	....	3	....	....	*Pasteurella pseudotuberculosis*	1	
									Mycobacterium tuberculosis	1	
									Corynebacterium pyogenes	2	
									Actinomyces necrophorus	3	29
Lymph glands	2	....	....	....	....	....	....	....		....	2
Miscellaneous swabs	10	1	....	....	....	....	....	....			11
Nasal exudate	2	1	....	....	....	1	....	....	*Brucella bronchiseptica*	1	5
Spleen	11	....	....	1	2	....	....	....	*Actinomyces necrophorus*	1	
									Pasteurella pseudotuberculosis	1	16
Turbinates	2	....	....	1	....	....	....	3		....	6
Uterus	....	....	....	1	....	....	....	....			1
TOTALS	130	5	16	8	7	4	8	10		22	210

*NOTE—The figures in this table include the results obtained from the examination of specimens received from various Canadian zoos, in addition to foxes, mink and chinchilla. Among the zoological specimens were a goat with tuberculosis due to the bovine strain of the tuberculosis bacillus, several monkeys infected with *Pasteurella pseudotuberculosis*, a wart hog, elk, and several types of deer.

EXAMINATION OF SPECIMENS FROM HUMANS

TYPE OF EXAMINATION	NUMBER
Blood cultures	1
Ear swab cultures	1
Faeces cultures	4
Nasal swab cultures	1
Opsonocytophagic tests	3
Skin swab cultures	6
Sputum cultures	5
Throat swab cultures	4
Urine cultures	2
TOTAL	27

SEROLOGICAL EXAMINATIONS

SOURCE OF MATERIAL	BRUCELLOSIS	VIBRIONIC ABORTION	LEPTOSPIROSIS	ERYSIPELAS	SALMONELLA	TOTAL
Bovine semen	5	....	....	....	....	5
Cattle	50	133	6	....	....	189
Dog	....	....	7	....	....	7
Horse	3	....	....	....	9	12
Human	5	....	....	1	....	6
Swine	5	....	....	5	5	15
TOTALS	68	133	13	6	14	234

EXAMINATION OF FEED SPECIMENS FROM CASES OF SUSPECTED FOOD POISONING

CASE	NUMBER
Cattle	6
Dogs	5
Horses	1
Humans	5
Mink	4
TOTAL	21

PREPARATION OF AUTOGENOUS IMMUNIZING AGENTS

ANIMAL	WART VACCINES	BACTERINS	TOXOIDS	TISSUE VACCINES	TOTAL
Cat	....	2	....	2	4
Cattle	17	4	....	....	21
Dog	24	18	....	....	42
Horse	....	7	....	8	15
Human	....	6	....	....	6
Mink	....	2	....	....	2
Sheep	....	2	1	11	14
Swine	....	5	....	....	5
Turkey	....	1	....	....	1
TOTALS	41	47	1	21	110

GENERAL OBSERVATIONS

In the course of the foregoing bacteriological examinations, a number of interesting facts were revealed.

Salmonella typhisuis

Early in the year, the lungs and several lymph glands from a pig were submitted for culture. The lesions in the lungs were superficially similar to those sometimes seen in tuberculosis but no evidence of acid-fast bacteria was found in smears made and culture yielded *Salmonella typhisuis.* This finding has been reported in another publication.[1]

Several weeks afterwards another specimen was received from a different farmer. The lesions in the lung were so similar to those seen in the previous specimen that, this time, we were expecting to recover *Salmonella typhisuis,* as we did. Unfortunately in both cases the pigs had been purchased at a community sale and our attempts to trace the infection were unsuccessful.

Listeria monocytogenes

In the past few years we have frequently had reason to suspect infection due to *Listeria monocytogenes* in cattle and occasionally in sheep. We have previously not succeeded in isolating this organism although in one case the brain lesions as revealed in sections justified the tentative diagnosis. Our first isolation of this organism was made in April, 1949, from a cattle-beast which had been sent in for observation, and which was suspected of having a "broken neck." This finding has been reported separately.[2]

[1]. Crossley, Vera M.; McKay, K. A.; McIntosh, R. A.; and Smith, D. L. T. The Occurrence of *Salmonella Typhisuis* on the North American Continent. Can. Jour. Comp. Med. 13 (1949): 205.

[2]. Fish, N. A. and Schroder, J. K. A Report on the Laboratory Diagnosis of Listerella Infection in a Cross bred Heifer. Can. Jour. Comp. Med. 13 (1949): 295.

In July, 1949, this organism was isolated from chinchilla—two animals on two different occasions from the same ranch. This isolation is covered in greater detail elsewhere in this report. We then recalled that in 1947 an organism which had been called a "haemolytic Corynebacterium" had been isolated from a similar condition in chinchilla. This isolation and a description of the condition will be found in the Report of the Ontario Veterinary College for 1947. Unfortunately, this culture has long been discarded but the record of its cultural characteristics leaves little doubt in our minds that it, too, was *Listeria monocytogenes*. It is possible that only the occurrence of the case in a cattle-beast in which we expected to find the organism and which so recently antedated the isolation of the organism from the chinchilla enabled us to establish the identity of the organism in this case.

Poisonous Algae

During the summer of 1949, the occurrence of a number of deaths in cattle was traced to poisonous algae. The details of this investigation have been reported.*

Canine Leptospirosis

Canine leptospirosis is a condition which has frequently been diagnosed at this institution from clinical symptoms, but of which no case had been confirmed by isolation of the organism, or by reproduction of the infection in experimental animals. On three occasions during 1949, *Leptospira canicola* was demonstrated in samples of urine submitted by the Small Animal Clinic.

A Condition in Swine

For some time, odd cases of a condition in swine characterized by fibrinous inflammation of the serous membranes, particularly the pericardium, and the joints have been encountered. On culture, the exudate from the pericardial, pleural or peritoneal cavities or from the joints almost invariably proved to be sterile although it was incubated on various media aerobically as well as in 10 per cent CO_2 and anaerobically. The fact that an organism similar to or identical with *Haemophilus suis* had been isolated from the condition referred to as "acute arthritis of swine" by Shanks in Northern Ireland—a condition in which joint involvement appears to be a more prominent feature than we have found it to be in the cases we have investigated—prompted us to use media specially prepared for the haemophilic bacteria. Using this media an organism which appears to be *Haemophilus suis* was isolated from the joints and from peritoneal exudate in the first case investigated. Other cases have since been diagnosed and a paper is at present being prepared for publication to present our findings.

RESEARCH

Two research problems are under investigation by members of the Department at the present time.

Investigation of Diarrhoeic Conditions and Septicaemia

Several severe outbreaks of "white scours" of calves, in the spring of 1949, in which treatment with streptomycin proved to be dramatically effective prompted further investigation of diarrhoeic conditions and septicaemia of young

* Stewart, A. G.; Barnum, D. A.; and Henderson, J. A. Algal Poisoning in Ontario. Can. Jour. Comp. Med. 14 (1950): 197.

animals, as well as a study of some of the effects of streptomycin, by Mr. McKay. A portion of the results of his investigation will be found reported elsewhere in this publication.

Vibrio foetus Infection

Vibrio foetus infection in cattle, which was first diagnosed, as far as this institution is concerned, in the summer of 1947, has since been diagnosed by isolation of the organism on a number of occasions—a total of five times, up to the end of the period covered by this report. In addition to these cases, the infection has been diagnosed by means of the agglutination test on several occasions when material for culture was not available. The infection is apparently widespread throughout Ontario; at any rate cases have been diagnosed in widely separated areas of the southern part of the Province where the cattle population is heavy. It would appear that the agglutination test should be widely employed as a diagnostic aid. The fact that the organism requires an atmosphere of 10 per cent CO_2 for growth and that it survives for a very short time on the ordinary media and under the usual storage conditions, prompted investigation of a variety of methods of growing the organism to produce antigen and to have fairly large amounts of live culture available for the investigation of other aspects of the disease problem. Some of the results obtained will be reported elsewhere and the investigation is being continued.

DEPARTMENT OF SMALL DOMESTIC AND FUR-BEARING ANIMALS

SMALL DOMESTIC ANIMALS

F. J. Cote, V.S., D.V.M.

The Small Domestic Animals Section is concerned with the teaching of diseases of the dog and cat; instruction in clinical and surgical procedure; and therapeutics and pharmacology as applied to small animal practice.

One addition to the faculty of the Department of Small Domestic and Fur-bearing Animals was made in the person of Dr. James Archibald. Dr. Archibald has been taking postgraduate work in experimental surgery under Dr. J. Markowitz at the University of Toronto, two days weekly.

During the fiscal year ending March 31, 1950, 1,700 cases were presented to the Small Animal Clinic. Clinical sessions were held every Monday, Tuesday, Thursday and Friday afternoons from 1:30 to 5:00 o'clock for the benefit of Fourth Year students. Instruction and surgical demonstrations were given by Dr. W. J. Rumney of Hamilton, Ontario. Each student was given an opportunity to perform surgical operations, treat animals and administer drugs under the direction of one of the instructors. Fourth Year students also received a one-hour lecture weekly on the diseases of small animals.

The Third Year curriculum included two one-hour lectures weekly on the diseases of small animals, as well as a two-hour period weekly under the heading of "Clinical Orientation". This subject covers an introduction to clinical methods, practical examination, and fundamentals of diagnostic procedures. The student is introduced to the various types of medication, methods of treatment, and the elementary principles of surgery. Third Year lectures and clinics were directed by Dr. Archibald.

We wish to extend our thanks to the other departments of the Ontario Veterinary College for their excellent co-operation, particularly the Departments of Pathology and Bacteriology, and the Radiology Section.

Following is a summary of the cases submitted to the Small Animal Clinic from April 1, 1949 to March 31, 1950.

CASES — SMALL ANIMAL CLINIC

NATURE OF CASE	NO. OF CANINE CASES	NO. OF FELINE CASES
Infectious Diseases		
VIRUS DISEASES		
Distemper	39	....
Encephalitis	5	....
Infectious hepatitis	2	....
Panleucopenia	....	24
Pneumonia	4	....
BACTERIAL DISEASES		
Mastitis	3	1
FUNGUS DISEASES		
Ringworm	2	....
SPIROCHAETAL DISEASES		
Leptospirosis	2	
NON-SPECIFIC INFECTIONS		
Abscess	37	6
Septicaemia	1	
Parasitic Diseases		
Coccidiosis	5	
External	42	
Helminthiasis	119	12
Diseases of Allergy		
Allergy	1	

NATURE OF CASE	NO. OF CANINE CASES	NO. OF FELINE CASES
Diseases Due to Chemical Agents or Food Poisoning		
Arsenic poisoning	1	....
Strychnine poisoning	4	....
Other possible poisons	1	....
Deficiency Diseases		
Avitaminosis (black tongue)	....	1
Malnutrition	7	....
Renal rickets	1	1
Diseases of Endocrine System		
Pseudopregnancy	3	....
Diseases of Digestive System		
DISEASES OF THE MOUTH		
Stomatitis	5	....
Tonsillitis	4	....
DISEASES OF THE PHARYNX		
Oesophagus stricture	1	....
Pharyngitis	2	....
DISEASES OF THE STOMACH		
Gastric ulcer	1	....
Gastritis	5	1
DISEASES OF THE INTESTINE		
Anal gland infected	15	....
Constipation	5	1
Enteritis	22	2
Gastro-enteritis	10	....
Intestinal obstruction	9	2
Intussusception	1	....
Prolapse of rectum	3	....
Diseases of the Respiratory System		
DISEASES OF THE NOSE		
Rhinitis	1	1
DISEASES OF THE LARYNX		
Laryngitis	1	....
DISEASES OF THE TRACHEA AND BRONCHI		
Bronchitis	3	....
Bronchotracheitis	67	....
DISEASES OF THE LUNG		
Pneumonia	33	1
Diseases of the Genito-Urinary System		
DISEASES OF THE BLADDER		
Cystic calculi	2	....
Cystitis	7	1
DISEASES OF THE KIDNEY		
Nephritis	6	....
Pyelonephritis	1	....
DISEASES OF THE UTERUS		
Dystocia	5	....
Metritis	5	....
Pyometra	1	....
MISCELLANEOUS		
Prostate hypertrophy	1	....
Diseases of the Glands		
Jaundice	1	....
Suppurative pancreatitis	1	....
Diseases of the Circulatory System		
Adenitis	1	....
Anaemia	3	....
Aneurism of aorta	1	....
Aneurism of femoral vein	1	....
Ascites	3	....
Bacteraemia	1	....
Cardiac valvular	3	....
Lymphostasis	1	....
Myocardial degeneration	4	....
Pericarditis	1	....
Toxaemia	....	1
Diseases of the Nervous System		
Concussion	2	....
Convulsions	3	....
Distemper (chorea)	12	....
Encephalitis	9	....
Epilepsy	1	....
Hysteria	1	....
Meningitis	2	....
Paralysis	14	....
Paraplegia	2	....
Diseases of the Skin		
Acanthosis nigricans	2	....
Dermatitis	61	....
Eczema	13	2
Pruritis	3	....
Surgical Conditions and Diseases		
STRUCTURAL		
Castration	25	43
Dew claws removed	5	....
Ingrown nail	2	....
Ovariectomy	207	43
Tail amputation	19	....
Toe amputation	1	....
Toenail removed	1	....
Tonsillectomy	1	....
SURGICAL DISEASES		
Arthritis	3	....
Cyst	6	....
Dentistry	12	1
Dislocations	13	1
Foreign body	2	....
Fractures	81	5
Hernia—diaphragmatic	2	....
inguinal	4	....
perineal	1	....
umbilical	7	....
Shock	3	....
Sinus	3	....
DISEASES OF THE EAR		
Canker	3	....
Ear mites	..	4
Haematoma	1	..
Otitis externa	13	2
DISEASES OF THE EYE		
Cataract	1	....
Conjunctivitis	7	....
Entropion	3	....
Enucleation of eyeball	6	....
Glaucoma	2	....
Haematoma	1	....

NATURE OF CASE	NO. OF CANINE CASES	NO. OF FELINE CASES
Surgical Conditions and Diseases—Continued		
Hypertrophy of Harder's gland	26	....
Keratitis—superficial	7	....
ulcerative	....	1
Membrane nicitans removed	3	....
Prolapse of eyeball	1	....
FOREIGN BODY		
Porcupine quills	3	....
NEOPLASMS		
Carcinoma	3	....
Fibroma	2	....
Fibrosarcoma	3	....
Granuloma	4	....
Leiomyoma	1	....
Lipoma	2	....
Mammary neoplasia	4	....
Melanoma	1	....
Papilloma	13	....
DISEASES OF THE MUSCLES		
Muscle atrophy	1	....
Myositis	2	....
WOUNDS		
Contusion	1	1
Haematoma	2	....
Incised	2	....
Lacerated	21	3
Congenital Deformities		
Atresi ani	....	1
Cleft palate	2	....
Malformed nasal chamber	1	
Examination		
Health	11	
Pregnancy	4	
Immunization		
Distemper	156	..
Panleucopenia	....	6
Rabies	7	
Parturition		
Caesarian	4	
Normal	6	
Miscellaneous		
Bath and groom	27	4 (comb out)
Boarders	24	2
Clip or pluck	37	
Clip toenails	9	....
Euthanasia	21	4
Tattoo	2	
Vocal chord removal	2	
X-ray for foreign body (none demonstrable)	12	
X-ray for fracture (no fracture evident)	19	
TOTALS	1,522	178
	(1,700 cases)	

FUR-BEARING ANIMALS

A. H. Kennedy, B.S.A., V.S., D.V.M., D.V.Sc.

The work of this section of the Department of Small Domestic and Fur-bearing Animals during the past fiscal year may be summarized as follows:

DISEASES OF FOXES

Due to the present low economic status of the fox industry, the work on diseases of foxes was greatly reduced. No outbreaks of distemper were brought to the attention of the College. Twenty-five complete blood counts and 33 fox tissue sections were examined for evidence of disease.

An outbreak of Shigella infection caused heavy mortality on a large fox ranch in Ontario. The effects of aureomycin and streptomycin on infections of this nature were studied. These antibiotics were found effective, especially when administered in the early stages of the disease. As a means of control, 300 cc. of an autogenous bacterin were prepared and administered to the foxes on the ranch which had not shown any clinical evidence of the infection. This bacterin proved to be effective.

A severe outbreak of Proteus infection resulted in serious losses on a large fox ranch in the eastern part of Ontario. Streptomycin and suphamethazine were effective in reducing the number of losses. Eight hundred and fifty cc. of an autogenous bacterin, prepared at the Ontario Veterinary College, were sent to the local veterinarian. This bacterin quickly brought the disease under control.

DISEASES OF MINK

During the year, 11,250 doses of tissue vaccine were distributed to mink ranchers and veterinarians in Ontario. Two hundred and seventy-eight mink tissue sections were examined at the College. Four mink ranches were visited to investigate outbreaks of disease and prescribe treatment.

GENERAL

Outbreaks of disease on two chinchilla ranches were investigated. Eight other fur farms were visited for the purpose of studying conditions and examining meats and fish which were being used as food.

Nine papers were published in veterinary journals.

DIAGNOSTIC SERVICE

The following table records the number and nature of disease and other conditions in the various species of fur-bearing animal examined during the past fiscal year.

DISEASE	FOXES	MINK	CHIN-CHILLAS	RABBITS	MISCEL-LANEOUS FUR-BEARING ANIMALS	TOTAL
Infectious Diseases						
Boils	....	21	....	....	....	21
Distemper	2	86	....	....	....	88
Klebsiella infection	....	42	....	....	....	42
Listerella infection	....	....	2	....	....	2
Listerella infection	....	....	2	....	....	2
Pasteurella infection	....	....	....	5	....	5
Proteus infection	....	15	....	....	....	15
Salmonella infection	....	29	....	....	....	29
Shigella infection	121	....	....	....	....	121
Staphylococcus infection	....	2	....	....	....	2
Streptococcus infection	....	4	....	....	....	4
Parasitic Diseases						
Ascariasis	1	....	....	....	....	1
Coccidiosis	....	....	....	6	....	6
Earmites	2	....	....	14	....	16
Tapeworm cysts	....	....	3	....	....	3
Trematode infestation	1	....	....	....	....	1
Wohlfahrtia infestation	....	22	....	....	....	22
Gastro-Intestinal Conditions						
Acute indigestion	....	1	9	....	....	10
Diarrhoea	3	3	21	2	....	29
Enteritis	5	3	11	....	1	20
Gastritis	....	3	....	....	....	3
Gastro-enteritis	9	17	2	....	....	28
Impaction of caecum	....	....	12	1	2	15
Intussusception	1	....	1	....	....	2
Peritonitis	....	8	2	....	....	10
Prolapse of rectum	....	....	1	....	....	1
Genito-Urinary Conditions						
Abortion	....	....	3	....	....	3
Cystic calculi	....	20	....	....	....	20
Cystitis	....	1	....	....	....	1
Dystocia	....	2	4	1	....	7

DISEASE	FOXES	MINK	CHIN-CHILLAS	RABBITS	MISCEL-LANEOUS FUR-BEARING ANIMALS	TOTAL
Genito-Urinary Conditions						
Metritis	....	....	2	....	....	2
Mammitis	....	....	1	1	1	3
Nephritis	....	6	2	1	....	9
Hepatic Degeneration						
Fatty degeneration	....	43	28	....	....	71
Fatty infiltration	....	1	....	....	....	1
Rupture of liver	1	2	1	....	....	4
Yellow liver	....	3	....	....	....	3
Nutritional Conditions						
Anaemia (platinum mutation foxes)	3	....	....	....	....	3
Nutritional anaemia (mink)	....	19	2	....	....	21
Other nutritional conditions	1	12	12	11	2	38
Respiratory Conditions						
Pneumonia	....	22	21	4	6	53
Pneumonia—purulent	....	1	1	2	....	4
Snuffles	....	....	....	7	....	7
Miscellaneous						
Abscess (neck)	....	1	....	2	....	3
Abscess (liver)	....	....	2	....	....	2
Abscess (lungs)	....	....	1	....	....	1
Abscess (mammary gland)	....	1	....	....	....	1
Abscess (sheath)	....	....	1	....	....	1
Agalactia	....	9	11	....	....	20
Breeding problems	....	....	12	....	....	12
Botulism	....	11	....	....	....	11
Cannibalism	....	....	....	....	4	4
Cleft palate	1	....	....	....	....	1
Choke	....	1	1	....	....	2
Chemical poisoning	....	1	....	....	....	1
Dental troubles	....	5	....	8	....	13
Exposure	....	....	....	5	....	5
Food poisoning	2	23	....	....	....	25
Fracture (jaw)	....	....	1	....	....	1
Fracture (leg)	....	....	1	....	....	1
Fur chewing	....	....	74	4	....	78
Hermaphrodite	....	....	....	1	....	1
Heat stroke	....	27	13	....	....	40
Injuries	....	2	7	1	....	10
Nursing sickness	....	18	....	....	....	18
Panniculitis	....	47	....	....	....	47
Posterior paralysis	....	7	....	5	....	12
Post-weaning paralysis	....	7	....	....	....	7
Pregnancy toxaemia	....	19	....	....	....	19
Septicaemia	1	6	6	3	....	16
Skin conditions	1	1	47	....	1	50
Slobbers	....	....	25	....	....	25
Sore hocks	....	....	....	1	....	1
Sterility	....	12	31	5	17	65
Stomatitis	....	7	....	....	....	7
Tail chewing	....	32	....	....	....	32
Tongue injuries	....	1	....	....	....	1
Toxaemia	1	....	....	4	....	5
Wry neck	....	....	....	5	....	5
Badly Decomposed	....	17	....	....	....	17
Undiagnosed	....	23	3	....	....	26
TOTALS	156	666	379	99	34	1,334

DEPARTMENT OF EXTENSION

MASTITIS LABORATORY

W. R. LeGrow, B.S.A., D.V.M., M.S., Ph.D.

The Mastitis Laboratory is concerned with the routine testing of milk samples and prescribes treatment for herds showing infection with mastitis. Advice is given to veterinarians concerning treatment and sanitary procedures for infected herds, and greater co-operation between the farmer and his veterinarian in dealing with the problems of mastitis control is advocated. Most of the organisms found in mastitis-infected herds are susceptible to the antibiotics which have been developed in recent years. Spread of mastitis and reinfection in most of our dairy herds can be controlled, or reduced to a minimum, by good sanitation and the efficient use of antibiotics.

The staff consisted of W. R. LeGrow, in charge; Miss S. Martin and Mr. L. Ballagh as technical staff; and Miss M. Cleland as stenographer.

During the year, 16,061 milk samples were submitted to the Laboratory for microscopic and cultural examination. Of this number, 12,161 or 75.71 per cent were negative and 3,900 or 24.29 per cent were positive for mastitis or showed the presence of mastitis organisms. Where infection was present, the organism was identified and treatment with one or more antibiotics recommended. In certain cases of mixed infection where very little benefit is derived from drug treatment, autogenous bacterins were prepared from the organisms isolated.

Work was carried out in 767 herds. Of these 177 or 22.07 per cent were completely negative for mastitis and 590 or 76.93 per cent contained one or more positive quarters. Mixed infections were quite prevalent. *Streptococcus agalactiae* continues to be the predominating organism in mastitis infection. There was a definite increase in the number of herds showing infection with haemolytic Staphylococcus organisms; the number of active cases of mastitis caused by this organism was high. Larger dosages of antibiotics will be necessary if a satisfactory therapeutic response is to be obtained against the Staphylococci.

A more detailed report of the results of the routine examinations is contained in Tables I, II, and III.

TABLE I
RECORD OF SUBMISSION OF MILK SAMPLES
April 1, 1949 - March 31, 1950

MONTH	SUBMITTED BY HERD OWNERS	SUBMITTED BY VETERINARIANS	SECURED BY O.V.C. STAFF INCLUDING SAMPLES FROM THE ONTARIO REFORMATORY AND ONTARIO HOSPITAL HERDS	TOTAL
1949				
April	602	442	264	1,308
May	540	335	463	1,338
June	447	292	420	1,159
July	365	245	296	906
August	440	170	866	1,476
September	306	390	244	940
October	515	302	420	1,237
November	632	485	521	1,638
December	456	441	586	1,483
1950				
January	435	810	241	1,486
February	467	513	599	1,579
March	237	869	405	1,511
TOTALS	5,442	5,294	5,325	16,061
PERCENTAGES	33.88	32.96	33.16	100

TABLE II

SUMMARY OF MONTHLY RESULTS OBTAINED FROM ROUTINE TESTING OF HERDS SHOWING VARIETY OF POSITIVE HERD INFECTIONS

	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
Total number of herds tested	68	81	74	49	41	33	53	81	56	87	71	73
Number of herds negative	24	16	23	11	9	7	15	15	9	21	15	12
Number of herds positive	44	65	51	38	32	26	38	66	47	66	56	61
Streptococcus agalactiae	28	39	36	23	15	14	17	34	28	20	27	22
Streptococcus agalactiae and *Streptococcus uberis*	2	2	....	....	1	....	1	1	2	....	....	2
Streptococcus agalactiae and haemolytic Staphylococcus	2	2	1	3	1	....	1	2	2	3	2	6
Streptococcus agalactiae and haemolytic Streptococci	....	....	....	....	....	....	....	1	....	....	....	....
Streptococcus agalactiae and Streptococci (Group C)	....	....	....	....	....	....	....	1	....	....	....	....
Streptococcus agalactiae and Streptococci (unidentified)	....	....	....	....	1	....	....	1	....	....	1	....
Streptococcus agalactiae and *Bacterium coli*	1	....	....	....	....	....	....	....	....	1	1	....
Streptococcus agalactiae and haemolytic colon	....	....	....	....	....	1	....	....	....	....	....	....
Streptococcus uberis	3	7	3	1	....	....	....	4	1	2	2	3
Streptococci (Group C)	....	2	....	....	....	....	....	....	....	....	....	....
Haemolytic Streptococci	....	1	4	1	2	2	1	3	2	6	1	1
Streptococci (unidentified)	....	2	....	....	4	....	3	1	1	5	1	1
Haemolytic Streptococci and *Bacterium coli*	....	....	....	....	....	....	....	....	....	1	....	....
Bacterium coli	....	3	4	....	1	....	2	3	3	2	5	3
Haemolytic colon	....	....	1	4	....	1	3	1	....	3	....	1
Haemolytic Staphylococcus	8	6	2	5	6	5	8	14	6	22	15	20
Haemolytic Staphylococcus and *Bacterium coli*	....	....	....	1	....	....	....	....	1	....	....	....
Haemolytic Staphylococcus and haemolytic colon	....	....	....	....	....	....	1	....	....	....	....	....
Haemolytic Staphylococcus and Streptococci (alpha)	....	....	....	....	....	....	....	....	....	1	....	....
Haemolytic Staphylococcus and haemolytic Streptococci	....	....	....	....	....	....	....	....	....	....	1	....
Corynebacterium pyogenes	....	1	....	....	1	....	1	....	1	....	....	1
Pseudomonas aeruginosa	....	....	....	....	....	1	....	....	....	....	....	....

TABLE III

SUMMARY OF MONTHLY RESULTS OBTAINED FROM ROUTINE TESTING OF INDIVIDUAL ANIMALS

MONTH	NUMBER OF SAMPLES	NEGATIVE	POSITIVE	STREPTOCOCCUS AGALACTIAE	HAEMOLYTIC STAPHYLOCOCCUS	HAEMOLYTIC STREPTOCOCCI	STREPTOCOCCUS UBERIS	BACTERIUM COLI	STREPTOCOCCI (UNIDENTIFIED)	HAEMOLYTIC COLON	STREPTOCOCCI (ALPHA)	CORYNEBACTERIUM PYOGENES	PASTEURELLA	STREPTOCOCCI (GROUP C)	BACILLUS PYOCYANEUS	PSEUDOMONAS AERUGINOSA
1949																
April	1,308	1,035	273	191	45	....	28	8	....	....	....	1	....	....	....	....
May	1,338	996	342	239	39	15	34	6	3	....	....	1	....	5	....	....
June	1,159	835	324	217	20	31	18	6	....	29	3	....	....	....	....	....
July	906	664	242	133	68	15	8	17	....	....	....	1	....	....	....	....
August	1,476	1,176	300	155	61	28	8	10	22	....	....	4	9	....	3	....
Sept.	940	741	226	116	59	20	11	....	8	10	....	....	....	....	....	2
October ..	1,237	955	282	162	85	5	2	3	14	6	....	2	1	2	....	....
Nov.	1,638	1,232	406	254	63	48	15	8	5	6	....	....	2	4	1	....
Dec.	1,483	1,160	323	195	63	28	8	17	11	....	....	1	....	....	....	....
1950																
Jan.	1,486	1,075	411	160	121	43	15	14	22	14	22	....	....	....	....	....
Feb.	1,579	1,198	381	235	101	11	8	18	2	4	....	....	....	....	2	....
March	1,511	1,121	390	210	120	8	16	18	8	6	....	3	....	....	1	....
TOTALS ..	16,061	12,161	3,900	2,267	845	252	171	125	95	75	25	13	12	11	7	2
PER-CENTAGES		75.71	24.29	58.13	21.67	6.46	4.38	3.21	2.44	1.92	.64	.33	.31	.28	.18	.05

Camp Test

The CAMP test for the identification of Lancefield's Group B Streptococci *(Streptococcus agalactiae)* has been used during the past fiscal year. This test gives satisfactory results as a routine laboratory test for the detection of this group of Streptococci.

Sensitivity Tests

During the year, 385 tests were conducted on mastitis organisms for sensitivity against antibiotics.

Autogenous Bacterins

These bacterins were supplied to veterinarians for use against mixed mastitis infection which did not show a favourable response to the antibiotics used. Thirty-nine autogenous bacterins, totalling 11,260 cc., were prepared and distributed to 29 herds.

Brucella Ring Test on Milk

Samples of milk were submitted by veterinarians attached to various county health units in Ontario. Of a total of 584 samples subjected to the Brucella ring test, 428 or 73.29 per cent proved negative, while 156 samples or 26.71 per cent were positive.

Distribution of Stencils

A large number of stencils on the control of mastitis were distributed to veterinarians and farmers during the year. These stencils were very favourably received, and have gone a long way in educating the farmer to look upon mastitis control as a farmer-veterinarian project. The contents of this stencil are inserted below.

ONTARIO VETERINARY COLLEGE
Guelph, Ontario

MASTITIS CAN BE CONTROLLED AND ERADICATED

Cause of Mastitis — The direct or immediate cause is bacteria (germs) getting into the tissue of the udder usually by way of the opening in the teat. The most serious of these germs is known as *Streptococcus agalactiae* which slowly spreads from cow to cow and causes a chronic mastitis. There are several indirect causes, i.e., conditions which favour the occurrence of mastitis. The most important are:

— injury to the teat or gland
— lack of bedding
— narrow or short stalls
— unsanitary stables and practices
— heavy protein feeding
— careless use of the milking machine (left on too long or the vacuum too high)

Spread of Mastitis — This is chiefly brought about by lack of sanitation.

e.g. — dirty milkers, either hand or machine
— dirty udder cloths
— wet milking or milking on the floor
— muddy cow yards, pastures and bedding
— occasionally infection is spread by calves nursing infected cows and then sucking the teats of calves or heifers in the same pen

REMEMBER — **Mastitis Can Be Controlled and Eradicated**

Two things are required: **1. Information**
2. Determination

Determination of Infection — Bacteriological examination.

The first move in mastitis control is a competent testing of the milk from every cow in the herd. Your veterinarian should collect milk samples and forward them to the College, Mastitis Laboratory, for examination. Many cows which have never shown any evidence of the disease may be harbouring the germs and spreading them to other cows in the stable — "carrier cows". This examination gives accurate information as to the presence and extent of infection. The test must be repeated from time to time. All replacements or additions to the herd should be examined by your veterinarian.

Practise Clean Milking —

Cleanliness is the key to the solution of the mastitis problem. No drug or drugs will cure mastitis without attention to rigid sanitation. Clean habits of milking and management must be practised.

(a) Wash the udder before milking with a chlorine solution — 400 parts per million H.T.H. or Diversol. Also, Roccal used in a dilution of one ounce to three gallons of water is excellent. A separate cloth must be used for each cow. Do NOT wash the whole herd with one cloth and one pail of disinfectant. This simply spreads the infection.

(b) The hands of the milker must be thoroughly wiped on a cloth soaked in an antiseptic solution, after stripping each cow.

(c) Wet milking must never be practised.

(d) Keep the milking equipment clean.

(e) Dip the teat cups in an antiseptic solution for 15 to 20 seconds between milking each cow.

(f) Keep the cows clean. Sprinkle the rear of the stalls with lime frequently and always keep the herd well bedded.

Segregation —

The infected cows must be placed at the end of the milking line and always milked last. Chronic cases which cannot be cured should be sold for slaughter as soon as possible. An acute case should be isolated where possible and should always be milked last.

Treatment —

All infected cows should be treated with one of the potent agents now available. The treatment where possible should be continued until the infection has been completely removed. Treatment should be given early. The mild cases and "carrier cows" usually respond to treatment. Without sanitation, the treated quarters will be infected again within a few weeks, and the money and time have been spent in vain. Make use of the strip cup before each milking.

Milking Practices and Management —

(a) It is preferable to start milking as soon as possible after the udder has been washed with warm water.

(b) The milking machine should never remain on the cow longer than the time required to complete the milking — approximately three to four minutes. Check the vacuum for your particular machine.

(c) Wet milking must not be tolerated.

(d) Keep the cows well bedded so that the udder remains clean, and is also protected from injury and cold.

Replacements — Don't buy mastitis-infected cows.
— Have your veterinarian examine all new cows.
— First-calf heifers are safest.

MASTITIS CONTROL SHOULD BE CONSIDERED A HERD PROBLEM

It involves:

1. The Dairyman — management, sanitation and strip cup.
2. The Veterinarian — periodic examination and accurate treatment.
3. The Laboratory — determination of the type of infection.

BRUCELLA LABORATORY

W. R. LeGrow, B.S.A., D.V.M., M.S., Ph.D.

The work of the Brucella Laboratory includes investigations and research on bovine brucellosis, routine work in blood testing, bacteriological examination of milk, examination of milk for the presence of Brucella agglutinins, distribution of Strain 19 vaccine for the calfhood vaccination programme, and a course of lectures to the third and fourth year veterinary students on Reportable Diseases and Regulations.

The staff during the past year consisted of the following: W. R. LeGrow, in charge; Miss J. Guthrie, Miss J. Evans and Miss F. Mano as technical staff; and Miss M. Urquhart and Miss G. Galloway, stenographers. Dr. N. A. Fish of the Department of Preventive Medicine and Hygiene rendered valuable assistance from time to time, which was greatly appreciated.

AGGLUTINATION TESTS

During the fiscal year, 69,683 blood samples were received by the Brucella Laboratory for the agglutination test. There is no charge to the veterinarian for conducting this test. A breakdown of the results obtained when these samples were tested is contained in Table I.

TABLE I

BLOOD SAMPLES RECEIVED FOR THE FISCAL YEAR ENDING MARCH 31, 1950

TEST GROUPS	BLOOD SAMPLES RECEIVED	POSITIVE SAMPLES		DOUBTFUL SAMPLES		NEGATIVE SAMPLES		SAMPLES BROKEN OR HAEMOLYSED	
		No.	%	No.	%	No.	%	No.	%
Routine tests	37,566	5,813	15.47	2,293	6.10	29,257	77.88	203	0.54
Calfhood vaccination	252	242	96.03	7	2.78	3	1.19	....	...
Area plan	392	25	6.38	25	6.38	339	86.48	3	0.76
Exports	24,462	498	2.04	1,394	5.70	22,560	92.22	10	0.04
Ontario hospital farms	1,232	176	14.28	75	6.09	974	79.06	7	0.57
Subsidiary areas	2,156	152	7.05	73	3.39	1,921	89.10	10	0.46
Adult vaccination	533	206	38.65	81	15.20	246	46.15	....	
Bruce peninsula	3,090	207	6.70	78	2.52	2,803	90.71	2	0.06
TOTALS	69,683	7,319	10.50	4,026	5.78	58,103	83.38	235	0.34

Routine Testing

This service is open to all livestock owners in the Province. Blood samples are taken by the veterinarian, and submitted for the agglutination test. As the blood test offers a means of early diagnosis and detection of bovine brucellosis infection in a herd, one cannot stress too strongly the value of routine periodic testing. When the disease is diagnosed during its early stages, control measures are more easily carried out. If the owner first suspects the presence of bovine brucellosis only when abortion has taken place, by then the disease has progressed so far throughout the herd that control measures have to be much more drastic.

Export Samples

In co-operation with the Federal Department of Agriculture, Health of Animals Division, 24,462 samples of bovine blood were received from veterinarians for animals intended for export to foreign countries, or for show purposes.

Bovine Brucellosis in the Bruce Peninsula

During the year, testing was conducted in the Bruce Peninsula to determine the incidence of Bang's Disease on an area basis. This is to be followed by an area calfhood vaccination programme with a view toward the complete eradication of the disease. Between August, 1949 and March 31, 1950, 3,090 blood samples were submitted to the laboratory. A breakdown of the results by townships is contained in Table II.

TABLE II

BRUCE PENINSULA BOVINE BRUCELLOSIS TESTING

August, 1949, to March 31, 1950

Total Number of Samples Submitted	3,090
Total number found positive	208 (6.70%)
Total number found doubtful	77 (2.52%)
Total number found negative	2,803 (90.71%)
Total number broken	2 (0.06%)

	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	TOTALS	PERCENTAGES
Lindsay										
No. of samples	....	296	462	....	....	....	....	....	758	....
Positive	....	1	13	....	....	....	....	....	14	1.85
Doubtful	....	3	10	....	....	....	....	....	13	1.74
Negative	....	292	439	....	....	....	....	....	731	96.14
Broken	....	....	....	....	....	....	....	....	....	....
St. Edmunds										
No. of samples	....	176	....	....	....	....	....	....	176	....
Positive	....	5	....	....	....	....	....	....	5	2.84
Doubtful	....	5	....	....	....	....	....	....	5	2.84
Negative	....	166	....	....	....	....	....	....	166	94.32
Broken	....	....	....	....	....	....	....	....	....	....
Eastnor										
No. of samples	....	14	....	....	24	152	214	531	935	....
Positive	....	6	....	....	5	7	6	27	51	5.45
Doubtful	....	1	....	....	1	9	2	14	27	2.88
Negative	....	7	....	....	18	136	205	490	856	91.66
Broken	....	....	....	....	....	....	1	....	1	0.01
Albemarle										
No. of samples	....	....	434	361	267	....	....	....	1,062	....
Positive	....	....	17	51	46	....	....	....	114	10.73
Doubtful	....	....	8	12	8	....	....	....	28	2.63
Negative	....	....	408	298	213	....	....	....	919	86.55
Broken	....	....	1	....	....	....	....	....	1	0.09
Townships Not Listed										
No. of samples	23	28	....	9	8	29	16	46	159	....
Positive	15	1	....	4	2	....	....	2	24	15.06
Doubtful	2	....	....	....	....	....	....	2	4	2.51
Negative	6	27	....	5	6	29	16	42	131	82.43
Broken	....	....	....	....	....	....	....	....	....	....

CALFHOOD VACCINATION

Supervised Calfhood Vaccination

Calfhood vaccination continues to be the chief cog in our brucellosis control programme. Up until the present time, vaccine made from Strain 19 *Brucella abortus* organisms has been found to be the most reliable product for effecting immunity or resistance against brucellosis in the bovine species. We admit that it has certain limitations. The immunity created is not complete, neither is it lifelong. However, it is the only recognized procedure for which there is a wide and statistically accepted evidence of substantial and uniform value.

Unfortunately, many veterinarians do not stress the necessity of a definite herd sanitary programme in conjunction with calfhood vaccination. Unless an effort is made to reduce, through sanitation, the amount of infective material that

may result from infection in the herd, many vaccinated animals will abort. This, of course, gives the farmer a lack of confidence in this control measure. If vaccination is not supplemented by sanitation, the livestock owner will be lulled into a sense of false security.

During the year, 174,102 doses of Strain 19 vaccine were distributed to 280 veterinarians operating under the calfhood vaccination plan. The work has been carried out in 55 counties. Vaccine, certificates, and ear tags were supplied to veterinarians free of charge. A summary of the calfhood vaccination programme is shown in Table III.

TABLE III
CALFHOOD VACCINATION
April 1, 1949, to March 31, 1950

NAME OF COUNTY	NUMBER OF CALVES VACCINATED IN EACH COUNTY	NAME OF COUNTY	NUMBER OF CALVES VACCINATED IN EACH COUNTY
Ontario		**Ontario**	
Algoma	87	Northumberland	3,055
Brant	3,043	Oxford	6,412
Bruce	2,424	Ontario	3,846
Carleton	8,046	Parry Sound	101
Cochrane	196	Peel	3,667
Dufferin	639	Perth	7,226
Dundas	7,080	Peterboro	2,027
Durham	1,955	Prescott	1,992
Elgin	2,362	Prince Edward	2,392
Essex	2,005	Rainy River	91
Frontenac	3,345	Renfrew	746
Glengarry	5,176	Russell	3,033
Grenville	3,436	Simcoe	3,877
Grey	2,406	Stormont	5,207
Haldimand	1,916	Thunder Bay	377
Haliburton	7	Timiskaming	376
Halton	2,920	Victoria	1,417
Hastings	2,441	Waterloo	4,049
Huron	2,658	Welland	718
Kent	601	Wellington	3,600
Lambton	1,696	Wentworth	3,177
Lanark	3,242	York	5,653
Leeds	8,224	**Quebec**	
Lennox and Addington	4,193	Gatineau	114
Lincoln	674	Papineau	25
Manitoulin	86		
Middlesex	4,996	SAMPLES UNACCOUNTED FOR	155
Nipissing	99		
Norfolk	1,482	TOTAL	140,768

Blood Titre of Vaccinated Animals under Field Conditions

Much controversy has been waged over the number of calfhood-vaccinated animals which remain positive under actual field conditions. In Table IV are the results of blood titres of vaccinated animals submitted for export from January 1, 1949 to March 31, 1950. Of a total of 12,989 animals, 180 or 1.38 per cent gave a positive reaction to the agglutination test. When this is compared with the percentage of positive samples obtained from animals tested during the fiscal year 1949-1950 (10.50 per cent), the value of calfhood vaccination can readily be appreciated.

TABLE IV

RESULTS OF BLOOD TITRES OF CALFHOOD-VACCINATED ANIMALS SUBMITTED FOR EXPORT

January 1, 1949 - March 31, 1950

YEAR OF VACCINATION	NUMBER OF NEGATIVE SAMPLES	NUMBER OF DOUBTFUL SAMPLES	NUMBER OF POSITIVE SAMPLES	TOTAL
1943	410	21	5	436
1944	811	43	14	868
1945	1,470	102	17	1,589
1946	2,816	192	25	3,033
1947	4,628	367	42	5,037
1948	1,519	183	62	1,764
1949	213	34	15	262
TOTAL	11,867 (91.31%)	942 (7.31%)	180 (1.38%)	12,989

Table V shows the results of testing of blood samples over a four-year period, between the fiscal years 1946-1947 and 1949-1950. In 1946-1947, the percentage of positive animals was 15.07. During the four-year period, this percentage has shown a steady decrease, until in the fiscal year 1949-1950 the number of blood samples found positive was 10.50 per cent. We feel that this decrease in the incidence of bovine brucellosis has been due largely to the calfhood vaccination programme.

TABLE V

AGGLUTINATION TITRE OF BLOOD SAMPLES RECEIVED AT THE BRUCELLA LABORATORY

YEAR SAMPLES RECEIVED	TOTAL NUMBER OF SAMPLES RECEIVED	POSITIVE		SUSPICIOUS		NEGATIVE		HAEMOLYSED OR BROKEN	
		No.	%	No.	%	No.	%	No.	%
April 1, 1946, to March 31, 1947	82,265	12,401	15.07	4,943	6.01	64,550	78.47	371	0.45
April 1, 1947, to March 31, 1948	78,467	10,575	13.48	6,012	7.66	61,633	78.55	247	0.31
April 1, 1948 to March 31, 1949	87,009	10,381	11.93	7,919	9.10	68,374	78.58	335	0.39
April 1, 1949, to March 31, 1950	69,683	7,319	10.50	4,026	5.78	58,103	83.38	235	0.34

Table VI is inserted to show the result of calfhood vaccination in a bovine brucellosis-positive herd. Vaccination has a strong tendency to lessen the effects of brucellosis so that the rate of abortion is lowered even among cows that actually acquire infection. The herd referred to in Table VI became infected in the fall of 1947, and a blood test on the herd in January, 1948, showed that 23 animals were positive. When the herd was tested in June, 1949, no positive animals were found and the herd has been negative for brucellosis on two tests since that date. All animals in this herd have been calfhood vaccinated.

TABLE VI

INCIDENCE OF BRUCELLA INFECTION
ONTARIO HOSPITAL HERD, HAMILTON, ONTARIO

DATE OF HERD TEST	NEGATIVE ANIMALS	SUSPICIOUS ANIMALS	POSITIVE ANIMALS
August, 1946	56	5	6
August, 1947	65	7	1
January, 1948[1]	32	21	23
April, 1948	53	15	6
June, 1948	54	16	5
June, 1949[2]	58	12	0
December, 1949	70	2	0
April, 1950	83	3	0

[1] Animals infected during the fall of 1947. Two abortions occurred.

[2] All animals positive in January, 1948, still in herd, with one exception.

NOTE:—The two animals that were suspicious on the December, 1949, test were suspicious on the test made in June, 1949. These two animals were positive on the April, 1948, test. The three suspicious animals in April, 1950, consisted of one animal 1½ years old, one animal 3 years old, and one 5 years of age. These three animals were calfhood vaccinated. The 5 year old animal had given a suspicious reaction in December, 1949, June, 1949 and June, 1948, and a positive reaction in January, 1948.

EXPERIMENTAL ADULT VACCINATION

Adult vaccination of cattle against brucellosis is being continued on an experimental basis. New herds are being added to our list each year. Control measures consist of the use of *Brucella abortus* polyvalent bacterin and strain 19 vaccine on adult cattle in a herd, supplemented by a good sanitary programme. A complete blood test is required, together with the history of the infection before control measures were instituted. Data is being collected on the incidence of abortion in these herds after vaccination, and yearly blood tests are taken to ascertain the length of time a blood titre is maintained after vaccination.

OTHER TESTS

Bacteriological Examination of Milk

During the past year, this service was open to the Board of Health in the City of Guelph. Weekly bacteriological examinations and phosphatase tests were made on milk, cream, and chocolate milk supplied by Guelph dairies. Butterfat tests were also conducted when required. This service was also available to the Ontario Reformatory.

Cultural Examination of Bovine Material

Foeti and foetal membranes were submitted from 20 animals that had aborted. These were subjected to culture and guinea pig inoculations. From 15 of these cases, the *Brucella abortus* organism (field strain) was isolated. In all cases where the *B. abortus* organism was isolated, blood and milk from the dam subsequently proved to be positive on the agglutination and ring tests for Brucella agglutinins.

Comparison of Strain 19 and Mucoid Phase Vaccine as Immunizing Agents

In January, 1950, adult animals in three herds were injected with strain 19 vaccine and mucoid phase vaccine. Monthly blood agglutination tests and opsonic index tests are being conducted in an effort to trace the duration of the blood titre and the phagocytic activity of the polymorphonuclear cells in these animals. In addition, monthly blood tests are made on two groups of calves under observation. It is too early to make any definite statement concerning the results obtained.

Detection of Brucella Agglutinins in Milk

The ring test has been used considerably during the year in the detection of Brucella agglutinins in the milk of cattle. The number of milk samples submitted for this test was 2,705. Of this number, 243 or nine per cent were suspicious or positive. Work was also done on the correlation of positive blood and positive milk in the bovine species.

PREPARATION OF ANTIGEN AND BACTERINS

Antigen used in the Brucella agglutination test was prepared at the laboratory. Cultures from the Animal Diseases Research Institute at Hull, Quebec, were used in antigen production. Ring test antigen was also prepared from strains of *Brucella abortus* organisms from Hull and the United States Bureau of Animal Industry, Washington.

Bacterins were prepared from strains of the *Brucella abortus* organism isolated from aborted foetal material. During the year, 8,000 cc. of polyvalent Brucella bacterin were distributed to veterinarians and used on pregnant animals in herds under the adult vaccination programme.

TUTORIAL WORK

During the academic year, a course of lectures on Reportable Diseases and Regulations was given to the senior year. During the spring term, the junior year received a similar course, with special reference to the Health of Animals Act as it relates to the control of contagious diseases in Canada.

EXTENSION WORK

In co-operation with the Agricultural Representative Branch, lectures were given by the staff of the Brucella Laboratory to short courses and farmer groups. The topics covered were: brucellosis, mastitis, general disease prevention, sanitation and calfhood vaccination. Meetings were attended in the following counties: Bruce, Grey, Middlesex, Huron, Wellington, Waterloo, Grenville, Frontenac and Ontario. A radio broadcast was made over Station CJOY, Guelph. Lectures were given at the annual meeting of the Nova Scotia Livestock Breeders at Truro, Nova Scotia.

POULTRY DISEASES LABORATORY

J. S. Glover, V.S., D.V.M.

This service consists of routine examinations of birds sent or brought to the laboratory; the distribution of fowl pox, pigeon pox, and infectious laryngotracheitis vaccines; visits to poultry and turkey farms and hatcheries; and investigational work.

A course of lectures and demonstrations in poultry diseases was given to the Third Year veterinary students during the fall and spring terms, to the Ontario Agricultural College Poultry Option students during the spring term, and to the Poultry Husbandry Short Course students during the month of January.

In addition, addresses were given at several meetings, including the summer meeting of the Ontario Poultry Industries Committee, the annual meeting of the Ontario Turkey Association, the annual meeting of the Ontario Veterinary Association, and a meeting of the Western Ontario Veterinary Association. Talks were prepared for the radio farm broadcast on subjects relating to the control of poultry diseases. Several articles were prepared for publication, including a set of 20 pamphlets on poultry diseases for distribution to poultry raisers.

TABLE I
ROUTINE EXAMINATIONS OF BIRDS

NATURE OF DISEASE OR CONDITION	NO. OF SPECIMENS
Abscessation	2
Acariasis	2
Ascariasis	168
Ascariasis and acariasis	6
Ascariasis and capillariasis	10
Ascariasis, capillariasis and taeniasis	1
Ascariasis and pediculosis	4
Ascariasis and taeniasis	27
Ascites and anasarca (chicks)	4
Ascites and anasarca (poults)	39
Aspergillosis (chickens)	34
Aspergillosis (turkeys)	15
Avian monocytosis	123
Avian monocytosis and ascariasis	2
Avian monocytosis and capillariasis	1
Avian monocytosis and taeniasis	1
Capillariasis	26
Capillariasis and pediculosis	3
Capillariasis and taeniasis	1
Chilling or overheating	54
Cholera, localized (chickens)	22
Cholera, septicaemic (caged wild birds)	3
Cholera, septicaemic (chickens)	6
Cholera, septicaemic (geese)	3
Cholera, septicaemic (turkeys)	13
Coccidiosis (chickens)	889
Coccidiosis (goslings)	3
Coccidiosis (pheasant)	1
Coccidiosis (pigeon)	1
Coccidiosis (poults)	138
Coccidiosis and ascariasis (chickens)	62
Coccidiosis, ascariasis and enterohepatitis (chickens)	2
Coccidiosis, ascariasis and pox (chicken)	1
Coccidiosis, ascariasis and staphylococcosis (chicken)	1
Coccidiosis, ascariasis and taeniasis (chickens)	4
Coccidiosis, ascariasis and vitamin A deficiency (chicken)	1
Coccidiosis, ascariasis and tumor (chicken)	1
Coccidiosis and capillariasis (chickens)	4
Coccidiosis and enterohepatitis (chickens)	5
Coccidiosis, enterohepatitis and pediculosis (chicken)	1
Coccidiosis and gizzard erosion (poult)	1
Coccidiosis and laryngotracheitis	3
Coccidiosis and pediculosis (chickens)	3
Coccidiosis and perosis (chickens)	4
Coccidiosis and pox (chicken)	1
Coccidiosis and riboflavin deficiency (poult)	1
Coccidiosis and staphylococcosis (chickens)	2
Coccidiosis and taeniasis (chickens)	3
Coccidiosis, taeniasis and pox (chicken)	1
Coccidiosis and vitamin A deficiency (chickens)	6
Coccidiosis and vitamin A deficiency (poult)	1
Coccidiosis and vitamin D deficiency (chickens)	4
Congenital gout (chicks)	11
Coryza	87
Coryza and ascariasis	11
Coryza, ascariasis and capillariasis	1
Emaciation	12
Enteritis	311
Enterohepatitis (adult turkeys)	52
Enterohepatitis (chickens)	24
Enterohepatitis (poults)	41
Erysipelothrix septicaemia (turkeys)	8
Eversion of cloaca	2
Freak (four-legged chick)	1
Tapeworm infestation (pheasant)	1
Gizzard erosion (poult)	1
Impacted crop	1
Impacted gizzard	5
Impacted intestine	15
Impacted oesophagus	1
Impacted oviduct	27
Impacted and ruptured oviduct	8
Impacted and ruptured oviduct and ascariasis	1
Infectious sinusitis (turkeys)	10
Injuries	95
Internal laying	24
Intestinal ulcers	1
Intussusception	1
Laryngotracheitis	47
Laryngotracheitis and ascariasis	2
Laryngotracheitis and taeniasis	1
New grain and other food poisoning	10
Ocular lymphomatosis	13
Ocular lymphomatosis and capillariasis	1
Ocular lymphomatosis and coccidiosis	4
Ocular lymphomatosis and taeniasis	1
Omphalitis (chicks)	35
Omphalitis (poults)	4
Osteopetrotic lymphomatosis	5
Osteopetrotic lymphomatosis and ascariasis	1
Osteopetrotic lymphomatosis and capillariasis	1
Osteopetrotic lymphomatosis and coccidiosis	1
Other nutritional conditions	415
Over-exposure to gas	51
Pantothenic acid deficiency	99
Pediculosis	6
Pendulous crop	1
Pericarditis	2
Peritonitis	2
Perosis	19
Pox (chickens)	17
Pox (pigeon)	1
Pox (turkeys)	2
Pox and ascariasis (chickens)	4

NATURE OF DISEASE OR CONDITION	NO. OF SPECIMENS
Pox, ascariasis and taeniasis (chicken)	1
Pox and taeniasis (chicken)	1
Pullorum (adults)	21
Pullorum (chicks)	188
Pullorum (grouse chicks)	3
Pullorum (pheasant chicks)	12
Pullorum (poults)	8
Pullorum and ascariasis (adult)	1
Pullorum and coccidiosis (chicks)	2
Pulmonary congestion	29
Pseudomonas aeruginosa infection (poults)	9
Riboflavin deficiency	23
Ruptured intestine	1
Ruptured liver	12
Ruptured liver and ascariasis	1
Ruptured oviduct	5
Sarcosporidiosis (duck)	1
Staphylococcosis	35
Staphylococcosis and capillariasis	1
Streptococcosis	10
Strongylosis (pigeons)	2
Subcutaneous emphysema	1
Taeniasis	46
Taeniasis and pediculosis	1
Tuberculosis (chickens)	36
Tuberculosis (guinea fowl)	1
Tuberculosis (turkey)	1
Tuberculosis and ascariasis (chicken)	1
Tuberculosis and impacted oviduct (chicken)	1
Tuberculosis, vitamin A deficiency and ascariasis (chicken)	1
Tumours	43
Tumours and ascariasis	1
Tumours and injury	1
Typhoid (chickens)	14
Typhoid (turkeys)	8
Typhoid and taeniasis (chicken)	1
Visceral lymphomatosis	276
Visceral lymphomatosis and ascariasis	41
Visceral lymphomatosis and capillariasis	4
Visceral lymphomatosis and coccidiosis	7
Visceral lymphomatosis and fowl pox	1
Visceral lymphomatosis and pediculosis	2
Visceral lymphomatosis and taeniasis	13
Visceral lymphomatosis, ascariasis and taeniasis	4
Visceral lymphomatosis, capillariasis and taeniasis	1
Visceral lymphomatosis, coccidiosis and ascariasis	1
Visceral lymphomatosis, coccidiosis and capillariasis	1
Visceral lymphomatosis, coccidiosis and taeniasis	2
Visceral lymphomatosis, impacted and ruptured oviduct	1
Vitamin A deficiency	209
Vitamin A deficiency and ascariasis	12
Vitamin D deficiency	28
No evidence of disease or putrid	380
TOTAL (1,952 consignments)	4,718

TABLE II

NUMBER OF CONSIGNMENTS AND SPECIMENS RECEIVED EACH MONTH

	CONSIGNMENTS				SPECIMENS			
	CHICKENS	TURKEYS	OTHER BIRDS	TOTAL	CHICKENS	TURKEYS	OTHER BIRDS	TOTAL
1949								
April	135	19	2	156	366	72	2	440
May	154	56	5	215	359	199	10	568
June	158	49	11	218	345	144	23	512
July	139	42	5	186	277	107	32	416
August	177	32	4	213	401	39	4	444
September	143	25	5	173	316	69	5	390
October	175	11	2	188	355	14	3	372
November	147	7	3	157	280	11	3	294
December	97	6	5	108	225	8	5	238
1950								
January	94	6	7	107	183	10	8	201
February	109	7	2	118	339	9	2	350
March	98	12	3	113	443	46	4	493
TOTALS	1,626	272	54	1,952	3,889	728	101	4,718

TABLE III

NUMBER OF CONSIGNMENTS RECEIVED FROM EACH COUNTY OR DISTRICT AND PLACES OUTSIDE ONTARIO

County or District	Chickens	Turkeys	Other Birds	Total
Algoma District	8	3	....	11
Brant	48	5	....	53
Bruce	60	14	2	76
Carleton	....	....	....	....
Cochrane District	12	....	....	12
Dufferin	50	3	1	54
Dundas	....	....	....	....
Durham	9	1	....	10
Elgin	8	3	....	11
Essex	9	5	1	15
Frontenac	7	2	....	9
Glengarry	1	....	....	1
Grenville	....	....	....	....
Grey	53	3	....	56
Haldimand	16	1	....	17
Halton	90	41	3	134
Hastings	25	....	....	25
Huron	77	9	1	87
Kenora District	3	....	....	3
Kent	35	6	....	41
Lambton	23	8	3	34
Lanark	....	1	....	1
Leeds	6	1	....	7
Lennox and Addington	3	....	....	3
Lincoln	17	2	2	21
Manitoulin District	1	....	....	1
Middlesex	48	12	....	60
Muskoka District	6	....	....	6
Nipissing District	3	....	....	3
Norfolk	14	3	2	19
Northumberland	24	....	5	29
Ontario	39	6	3	48
Oxford	53	18	1	62
Parry Sound District	8	....	....	8
Peel	79	15	7	101
Perth	72	7	....	79
Peterborough	18	1	....	19
Prescott	....	....	....	..
Prince Edward	16	1	....	17
Rainy River District	....	....	....	....
Renfrew	2	....	....	2
Russell	....	....	....	..
Simcoe	52	7	2	61
Stormont	3	1	....	4
Sudbury District	4	....	....	4
Thunder Bay District	1	....	1	2
Timiskaming District	7	1	....	8
Victoria	13	1	....	14
Waterloo	129	13	2	144
Welland	10	....	....	10
Wellington	279	60	10	349
Wentworth	54	3	4	61
York	128	25	3	156
Quebec	1	....	....	1
No address	2	....	1	3
Totals	1,626	272	54	1,952

DISTRIBUTION OF VACCINES

During the year, 241,500 doses of fowl pox vaccine, 84,500 doses of infectious laryngotracheitis vaccine, and 11,100 doses of pigeon pox vaccine were distributed.

A BRIEF REVIEW OF SOME OF THE CAUSES OF MORBIDITY AND MORTALITY IN ONTARIO DURING THE PAST FISCAL YEAR

This report is based on examinations made in the poultry diseases diagnostic laboratory, and on investigations conducted on certain farms.

Pullorum Disease

During the year, *Salmonella pullorum* was isolated from 235 specimens or about five per cent of the total number of birds received and examined, compared with 11 per cent during the previous year and 17 per cent during the fiscal year 1947-1948. These specimens included chicks, adult fowls, poults, grouse and pheasant chicks. In no instance did these affected birds originate from approved hatcheries.

Omphalitis

This condition, which is strictly a hatchery problem, was very prevalent in this province a few years ago. Most hatcheries now adopt certain measures, suggested by us, to prevent its occurrence, and the incidence of omphalitis in chicks and poults examined here during the first four months of 1950 was much lower than during the corresponding periods for the past several years.

Tuberculosis

Although this disease is responsible for heavy losses to the poultry industry in some provinces and states, it is not a serious economic problem in Ontario. As indicated in Table I, only 41 specimens received were found to be affected with tuberculosis. All of these were chickens with the exception of two (one turkey and one guinea fowl). This is only the second turkey affected with tuberculosis that the writer has seen here.

Typhoid

For the first time in Ontario, fowl typhoid was diagnosed in turkeys, during 1949. The first outbreak occurred in September in Peel County, and the second in November in Middlesex County. Fairly heavy losses occurred in both flocks. Several flocks of chickens were affected in Leeds County, and in August one flock was affected in Waterloo County. Fowl typhoid is now on the list of reportable diseases.

Cholera

Pasteurella avicida was isolated from birds received from poultry flocks in seven different counties, from geese in two counties, from turkeys in four counties, and from caged wild birds in one county. In none of the outbreaks were the losses very high. In some cases, the septicaemic form of cholera was present. while in others a localized form only was manifested.

Infectious Sinusitis

Although only a few birds affected with this condition, which appears to be specific for turkeys, were received at the poultry diseases laboratory this year, the disease was quite prevalent. On some farms, a large percentage of the turkeys was affected.

Infectious sinusitis occurs in one or two forms or a combination of the two. In one form, the sinuses are filled with an exudate, and in the other there is lower respiratory tract involvement. The sinus form is characterized by the distension of one or both intraorbital sinuses with a whitish or almost colourless semi-gelatinous exudate. Caseation of this exudate usually does not occur in typical outbreaks. When the lower respiratory tract is involved, pneumonia and pleuritis are observed, and caseated exudate is found on the walls of some of the air sacs. We have not seen this form in any of the specimens examined here. For several years, the standard treatment employed was to instil into the affected sinus one cubic centimetre of a freshly prepared four per cent solution of silver nitrate after aspiration of the exudate. The solution was gently massaged into the tissues and in most instances this resulted in complete recovery in about 10 days. Occasionally a second treatment was necessary. In October, injections of streptomycin were tried in a large number of turkeys. A report of this treatment has been published.*

* Glover, J. S. Report of Treatment of Infectious Sinusitis in Turkeys with Streptomycin. Can. Jour. Comp. Med. 14 (1950): 166.

Leucosis

Three hundred and sixty-four, or approximately 7.7 per cent. of the specimens received during the year showed lesions of leucosis. Of these, 342 were visceral lymphomatosis, 15 ocular lymphomatosis, and seven osteopetrotic lymphomatosis. There is strong evidence to support the view that visceral lymphomatosis can be transmitted directly from parent to progeny through hatching eggs. Other experiments and observations suggest that it can also be transmitted by the respiratory route.

Coccidiosis

This disease continues to take a heavy toll, as indicated in Table I. Much of this loss could be prevented if a few simple rules were followed. Poor management can be held responsible for much of the high mortality. A suitable sulphanilamide drug, used as directed by someone who has a sound knowledge of avian coccidiosis, has reduced losses to a minimum on many chicken and turkey ranches.

Gapeworm Infestation

Gapeworms *(Syngamus trachea)* were found in one pheasant brought to the laboratory for examination. The veterinarian who submitted the specimens said that he had found several other pheasants in the flock similarly affected. Mention is made of this here merely because, although gapeworm infestation is widely distributed in chickens, turkeys and some other birds in various parts of the world. we have no previous record of finding these worms in specimens submitted to this laboratory.

Ascites and Anasarca

This condition was found more often in poults than in chicks. At times, the mortality rate is high, and one turkey raiser lost about 20 per cent of his poults from this affection. Heaviest losses occur when the birds are from one to two weeks old. Undoubtedly, most of the cases were the result of too much sodium salt. and from observations and tests made the greatest factor was the accumulation of sodium chloride in feed troughs by gravitation. In no instance did a chemical analysis of the drinking water show an abnormally high sodium content.

RESEARCH PROBLEMS AND CASE REPORTS

THE USE OF STREPTOMYCIN IN FIELD OUTBREAKS OF ACUTE CALF SCOURS

J. A. Henderson, D.V.M., M.S. and K. A. McKay, B.A.

In previous issues of the report of the Ontario Veterinary College, reference has been made to acute calf scours or "white scours". It is one of the most important and destructive diseases affecting calves in Ontario and is responsible for heavy economic losses each year. Calf scours is a disease of the newborn, in its typical form attacking calves within their first week of life. In most cases sudden and profuse diarrhoea appears as an early symptom. The faeces are light in colour, foul-smelling and filled with gas bubbles. The temperature is variable but seldom exceeds 104 degrees. The course is rapid; the calf becomes dehydrated rapidly and dies within a day or two of the onset of symptoms, apparently from toxaemia. Occasionally peracute cases occur, characterized by death after a few hours lassitude and by the absence of diarrhoea. In older calves the disease may assume a subacute or chronic form. Post-mortem findings are often of doubtful diagnostic significance. There is usually a degree of hyperaemia and oedema of the digestive tract, a slight increase in fluid found in the body cavities and degenerative changes in the liver and kidney. Pneumonia is unusual except in cases of long standing.

There has been some doubt concerning the etiology of acute calf scours but it is generally attributed to infection by pathogenic strains of *Escherichia coli* [1, 2]. In addition, inadequate nutrition of the dam, particularly with reference to vitamin A, lowers the resistance of the newborn calf to this and other infections. The fact that the majority of outbreaks occur during the winter and spring months points to the importance of this factor. However, once the disease is established in a herd and the virulence of the organism has increased, it may attack calves the nutritional history of which appears excellent. In such herds, all calves born over a period of months may become affected, resulting in a high death rate.

The control of this condition has been centred on general sanitary measures, supplemented on occasion by the use of immune serum or sulphonamide drugs. While generally valuable, these procedures have been only moderately successful in severe outbreaks and the search for a more acceptable therapeutic agent has been continued. When McKay and Rowsell[3] first demonstrated the marked bactericidal effect of streptomycin against gram-negative organisms in the intestinal tract of the normal calf, it was decided that this antibiotic should be tested in typical outbreaks of acute calf scours under field conditions. These conditions precluded the possibility of maintaining untreated controls, and it was not always possible to obtain post-treatment faecal samples for bacteriological examination. Nevertheless, the clinical results were sufficiently promising to warrant a preliminary report at this time.

HERD NUMBER I

This herd was a large, well-managed herd of Holsteins. Calves were born in clean maternity pens and transferred to individual calf pens before they were a week old. During September, October and November, 1949, nine calves died at an early age, presumably from acute scours although in some instances, other causes of death may have been involved. Only two calves were born in December and both of these lived. However, an extremely valuable calf, born apparently

healthy on January 3, died the next day, and this animal was brought to the College for diagnosis. Post-mortem examination revealed a large amount of mucus in the abomasum and liquid faeces in both large and small intestines. A mucoid type of *E. coli* was cultured abundantly from faeces and various organs.

When the farm was visited on January 5, swabs were taken from the walls and floor of several of the maternity pens, and mucoid colon could be grown from most locations. Faecal samples from the two normal December calves in the calf barn showed normal colon organisms.

Since then (until June 3, 1950), 16 calves have been born on the farm. With two exceptions, each has received one-quarter gram of streptomycin chloride at birth and daily until four to six doses have been given. The streptomycin used was in one-gram vials, the whole being dissolved in 10 cc. of water, the appropriate doses given *per os*, and the remainder kept refrigerated until it was used. Of these 14 treated calves only one died. It was born on April 22 and, although it was not seen by the writers, it was thought by the attending veterinarian to have suffered from scours. The two untreated calves were bull calves of little value and were left untreated by request. The first, born on January 14, remained healthy. The second, born on January 27, died on the third day, apparently of typical scours although it was not examined bacteriologically.

HERD NUMBER II

Like the previous group, this was a Holstein herd, well-managed but with less elaborate equipment. The 20 or so cows in the milking herd were in good condition and showed every evidence of painstaking care. Parturition occurred in a maternity pen but the calf was soon transferred to another pen with other calves of similar age.

During December, 1949, and early January, 1950, three calves were lost due to acute scours. Symptoms appeared within two or three days of birth and death occurred within a week. Treatment varied but all calves received full therapeutic doses of sulphonamide preparations. The last death occurred on January 5, and the carcass was brought to the College for post-mortem examination. The herd was visited the same night.

At this time there were four young calves on the farm. No. 1 (eight days old) was scouring badly but was fairly strong and was thought by the owner to be at least becoming no worse. No. 2 (seven days old) was also scouring badly. It was weak and dehydrated and its chances of recovery appeared very poor. Both these calves were under treatment with combinations of sulphathiazole drugs. Numbers 3 and 4, which had been born the day before, were untreated and appeared normal. Faecal samples were taken from all four calves and the dam of No. 2 and in addition swabs were taken from the vulva of the same cow and from the maternity pen. Mucoid colon was recovered from the faeces of calf No. 4 (one day old, untreated), the faeces of the cow, and from the maternity pen. All samples, including the dead calf examined at the College, were negative for colon organisms. This was undoubtedly due to heavy sulpha therapy, except in the case of calf No. 3 where the organisms had not yet become established.

On the basis of symptoms, streptomycin therapy was instituted on the night of January 5, using the same dosage and procedure as in Herd Number I and treating all four calves. The herd was visited again on January 10 and again faecal samples were taken from the treated calves. All calves were passing normal

faeces and were apparently clinically normal. The record of calf No. 2 was especially interesting. The owner reported that scouring ceased the day following the first dose of streptomycin but that the animal appeared weak and lifeless for another day, after which it improved rapidly. When seen on January 10, it was quite active and appeared none the worse for its experience. The faecal samples taken on January 10 all showed normal colon in reduced numbers. No mucoid colonies were observed.

Between January and June, 1950, eight calves were born in this herd. All survived. The early calves received streptomycin from birth but the last two or three remained normal without treatment. The owner observed that in some instances when the calf received streptomycin from the first four days of life it began to scour about the sixth day. However, the appetite remained good, no other symptoms developed and the diarrhoea responded promptly to further streptomycin therapy.

HERD NUMBER III

This herd presented a sharp contrast to the preceding herds in that general sanitary conditions left much to be desired. The cattle were of mixed breeding, and, for the most part, had been purchased as bred cows from various sources. Twelve calves were born in this herd during the winter. At the time of our visit (March 9), ten of these had died of scours and the remaining two were severely affected. Calf No. 1, between two and three weeks of age, showed marked diarrhoea, emaciation and dehydration. It had been affected for 10 or more days. Calf No. 2, three days old, had just started to scour that morning. Faecal samples were taken from both calves and a four-day course of streptomycin prescribed. Cultures from these samples showed both normal and mucoid coliform organisms in No. 1 and only mucoid types in No. 2.

No further visit was made to this herd and only one communication was received from the owner. About 10 days after our visit he wrote to say that both treated calves were apparently well, improvement having started the day after the first dose of streptomycin.

HERD NUMBER IV

This was a grade Hereford herd under good average management. Four calves had died previous to our first visit on March 21. Three of these were less than a week old at the time of death. Six remaining calves ranged in age from eight to 28 days. All calves had had diarrhoea during their first week or immediately following but had responded fairly well to sulphamethazine and anti-calf-scour serum. However, most of them had abnormally soft faeces and they were generally unthrifty. Faecal samples were taken and streptomycin therapy instituted. Mucoid coliform organisms were found in four of the six samples although they did not predominate over normal types.

On March 25, definite clinical improvement was noted, and faecal samples taken then revealed a complete absence of coliform organisms in four calves, normal colon in one, and a few mucoid colonies in the other. The owner reports since that regular dosing of his newborn calves with streptomycin appears to have eliminated his problem.

HERD NUMBER V

The owner of this herd followed the practice of purchasing day-old calves and raising them 'on the pail'. No calves had been lost but when the herd was visited on March 27, two 10-day old calves were scouring and unthrifty although

not markedly ill. Calf No. 1 had had diarrhoea for four or five days and was under treatment with a sulphathiazole preparation. Calf No. 2 had shown symptoms for only two days and had received no treatment. Faecal samples were collected and a four-day course of streptomycin started. Cultures from calf No. 1 failed to show growth whereas those from calf No. 2 showed mucoid colon. Clinical improvement was rapid and faecal samples collected on March 31 showed a few colonies of normal colon from calf No. 1 and no coliform organisms from calf No. 2.

DISCUSSION

In addition to the herds listed above, numerous individual cases have been treated with generally satisfactory results. A similar outbreak in lambs from which mucoid colon was isolated responded equally well. It is of interest to note that in no instance was any cleaning or disinfection of the premises advocated, and, in all cases, therapy other than streptomycin was immediately discontinued. Nevertheless, response in clinically affected animals was almost invariably prompt, and newborn calves could be adequately protected by immediate dosing. While sometimes it may be necessary to dose for a period longer than four days, this period proved satisfactory. Cases of scours appearing after this period may be expected to be less acute and to respond readily to further streptomycin therapy.

It should be pointed out, however, that all cases here reported were uncomplicated scours apparently due to infection with a mucoid coliform organism. It is not suggested that streptomycin would prove equally effective against other types.

SUMMARY

A report is presented on the use of streptomycin in field outbreaks of calf scours thought to be caused by mucoid coliform organisms. Streptomycin in one-quarter gram dosage by the mouth proved effective both in treatment and prophylaxis.

REFERENCES

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2. Lovell, R. Classification of *Bacterium coli* from Diseased Calves. Jour. Path. and Bact. 44 (1937): 125.
3. McKay, K. A. and Rowsell, H. C. The Effect of the Oral Administration of Streptomycin on the Intestinal Bacterial Flora of Newborn Calves. Report of the Ontario Veterinary College. 1949.

THE EFFECT OF THE ORAL ADMINISTRATION OF STREPTOMYCIN ON THE INTESTINAL BACTERIAL FLORA OF NEWBORN CALVES

K. A. McKay, B.A. and H. C. Rowsell, D.V.M.

In the spring of 1949, "white scours" in calves was extremely prevalent in southern Ontario. In many of the outbreaks the methods of treatment which formerly had given good results proved to be ineffective. The excellent results obtained in one acute outbreak from the oral administration of streptomycin as observed by Dr. F. W. Schofield, head of the Department of Pathology in the Ontario Veterinary College, led to a series of investigations, one section of which is reported here.

It was felt that, at the same time as the curative action of streptomycin in cases of the disease was being studied, it would be well to undertake a study of the bacterial flora of the intestine of normal newborn calves and the effect

produced upon it by administering streptomycin in various dosages. The primary purpose of this part of the investigation was to discover the dose of the antibiotic which would produce an effective level in cases of the disease. At the same time, it was hoped that, by making use of some of the newer methods of classification devised for the Enterobacteria, we might be able to determine essential differences between the colon bacillus present in the intestine of normal calves and the organisms found in cases of "white scours" and in calf septicaemia.

The studies of Jensen[1] in 1913 led that worker to believe that "white scours" was caused by strains of *Escherichia coli* which had become pathogenic for the young calf. Studies of the normal intestinal flora of the calf show that *E. coli* is present in large numbers, a result which is confirmed by the present report. Later workers such as Theobald Smith[2], in 1925, Sigmund[3], in 1934, Lovell and Hughes[4], in 1935, and Koser[5] in 1935 believed that special races of *E. coli* were responsible. The possibility of virus etiology has been suggested by many workers, but up to the present time experimental evidence is lacking in this field. Light and Hodes[6] in 1949 reported the presence of, and isolated a filtrable agent in the stools of young human infants suffering from epidemic diarrhoea and reproduced this condition in calves. It seems improbable that this disease is identical to "white scours".

In this paper, we do not propose to deal with any of the nutritional factors concerned in the etiology of this disease, but a great deal of the literature is concerned with this aspect. Sutton and Kaeser[7] in 1946 showed that the blood plasma level of vitamin A increased rapidly after ingestion of colostrum. Their findings also further confirmed the fact that protective antibodies in the colostrum transfer passive immunity to the calf. Savage and McKay[8] in 1942 have expressed the belief that a synergism existed between vitamin A and vitamin C and that if enough A were provided, sufficient C would be available. Lundquist and Phillips[9] (1943) believe, however, that the young animal is unable to synthesize vitamin C in the first days of life, due to the inactivity of the rumen at this time.

MATERIALS AND METHODS

The calves selected for this experiment were newborn calves belonging to the Guernsey, Jersey, Holstein and Shorthorn breeds. They represented samples of calves born in a well-managed herd during the months of June and July, when the cows had access to good pasture. Faecal samples were taken as soon as practicable after birth, and in no instance was this period greater than 18 hours.

The investigation required various laboratory techniques and these workers desire to stress the point that in order to definitely establish statistical data many more calves would be needed. A total of 180 total and coliform bacterial counts were carried out in 18 calves. Differential microscopic counts were performed in the same number. At the same time cultural differentiations were done on all the samples taken. Red bile agar was used to identify the coliform lactose-fermenting organisms, while tryptone glucose extract agar was used for the total count. For cultural differentiation of the coliform group, MacConkey agar plates were utilized. For all other types of bacteria, blood enriched (six per cent) agar plates were plated and incubated aerobically, anaerobically and under CO_2 tension. For

maintaining cultures for identification, trypticase, tryptose, thioglycollate, and blood agar slopes were the media of choice. Further details of the methods and materials employed are described under each section.

BACTERIOLOGICAL STUDIES

Microscopic Differential Counts

A differential microscopic bacterial count was carried out on each sample of faeces from the normal calves. Gram's and acid-fast smears were made from the one in ten-thousand dilution of the faeces which permitted an even distribution of the organisms for counting. A total of 100 organisms were counted from various microscopic fields using the same technique as for a differential white count. An average of 10 counts was made on the faecal samples of each of the eight normal calves and the results were recorded as to morphology, staining characteristics, and numbers. Table I represents the average mean in percentage of the 10 counts for each of the normal calves.

TABLE I

THE DIFFERENTIAL MICROSCOPIC COUNTS ON EACH OF THE NORMAL CALVES

	GRAM-POSITIVE				GRAM-NEGATIVE		
CALF NO.	RODS	ENTERO-COCCI	SPORES	FILA-MENTS	RODS, COCCAL BACILLUS	FILA-MENTS	ACID-FAST
No. CI	16.7	28.8	0.71	Negative	53.8	0.008	Negative
No. CII	16.9	17.45	1.63	Negative	62.1	1.94	Negative
No. CIII	13.2	29.6	1.3	0.3	54.8	0.8	Negative
No. CIV	15.1	34.2	1.0	0.1	49.6	....	Negative
No. CV	14.6	24.9	0.5	Negative	59.6	0.4	Negative
No. CVI	15.5	23.7	1.2	0.8	58.6	....	Negative
No. CVII	15.7	28.8	1.8	Negative	53.7	....	Negative
No. CVIII ..	15.0	24.4	0.77	Negative	59.8	0.14	Negative
TOTALS	122.7	211.85	8.91	1.2	452.2	3.288	Negative
AVERAGE	15.33	26.48	1.113	0.15	56.52	0.411	Negative

Gram-positive organisms — 43.07 per cent
Gram-negative organisms — 56.93 per cent
Acid-fast — Negative for whole period

Acid-fast organisms were not a part of the normal flora of the calves examined. The gram-positive organisms represented 43 per cent of the total flora while the gram-negative were in the majority at 57 per cent. In the breakdown of types we find the gram-negative rods and coccobacilli comprising almost the entire gram-negative flora at 56.5 per cent with a few gram-negative filaments at 0.4 per cent. The enterococci and rods are the largest groups present in the gram-positive flora, comprising together 42 per cent of the total. Spore-forming and filamentous types of organisms do not seem to be present in the significant numbers found in older animals. The absence of rumen-type bacteria may be due to the inactivity of this organ throughout this period.

Plate Counts

Total and coliform bacterial plate counts were done on each sample of faeces immediately after the sample was taken. Red bile agar was used to differentiate the colon bacteria and tryptone glucose extract agar for the total count. For the purpose of this report, the table and graphs illustrating the counts for all the treated and normal calves will be omitted. However, the significant tables and graphs pertaining to the geometric mean of the total and coliform counts will be included. In Fig. 1, we find that 24 hours after birth the total count ranged between the logarithms of 10^9 and 10^{11}.

Sporadic variation is evident for the first 22 days after which is noted a tendency for the counts to decrease to within logarithms of 10^8 and 10^{10}. The colon count shows a direct relationship to the total count, in that a rise in the total count shows a similar rise in the coliform count. It is apparent that in the calf, for approximately the first eight weeks, the bacterial flora does not approach a state of equilibrium.

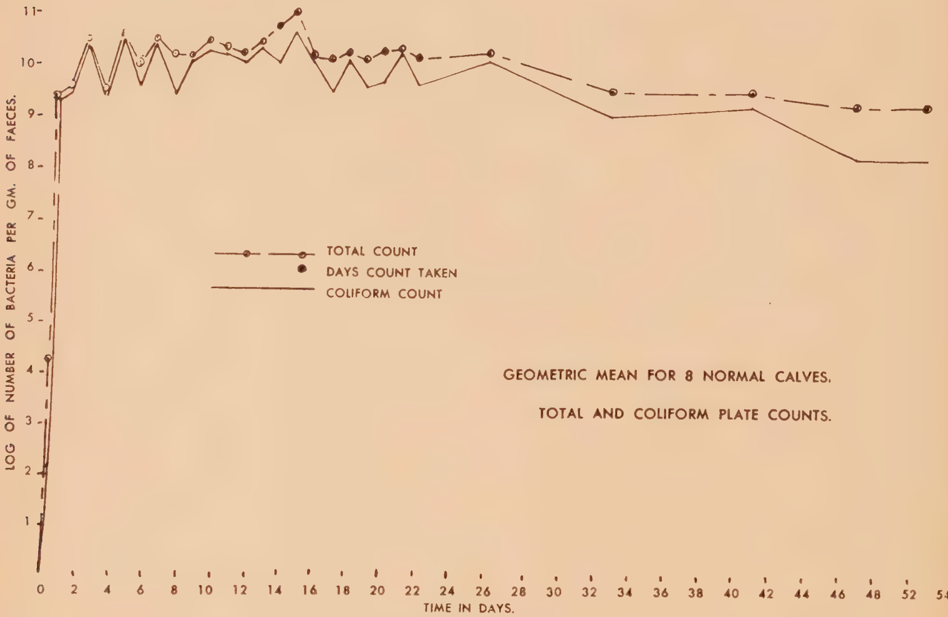

Fig. 1. GEOMETRIC MEAN CURVE FOR THE EIGHT NORMAL CALVES.

It appears significant that there is a sudden invasion of bacteria within the normal intestine after birth in almost infinite numbers. It would be reasonable to assume that the young animal is highly susceptible to infection during early life, and that any marked disturbance in the equilibrium of the normal flora may give rise to abnormal function. Diet and nutrition must at the same time be considered, however, the food of the calf during this period consists almost entirely of milk. With this factor constant, a significant change in the numbers and types of bacteria may assume a greater importance as part of a disease process. In "white scours" of calves many workers have recognized the bacterial flora as being predominantly gram-negative and made up of members of the coliform family[1, 2]. The gram-positive enterococci and rods tend to disappear to the advantage of the coliform groups, which have taken over almost the entire bacterial flora.

TABLE II

TOTAL AND COLIFORM PLATE COUNTS* FOR TREATED CALF L-148
(DOSAGE — 250,000 UNITS DAILY — 4 DAYS)

AGE OF CALF	DAYS OF TREATMENT	TOTAL COUNT	COLIFORM COUNT
2 days	....	43,000,000,000	31,200,000,000
4 days	....	13,700,000,000	12,700,000,000
8 days	....	23,100,000,000	15,100,000,000
9 days	....	16,800,000,000	11,300,000,000
11 days	....	27,200,000,000	20,300,000,000
14 days	Treated	38,400,000,000	13,300,000,000
15 days	Treated	47,200,000,000	0
16 days	Treated	6,890,000,000	0
17 days	Treated	2,630,000,000	0
18 days	....	5,560,000,000	100
19 days	....	26,600,000,000	40,000
20 days	....	27,000,000,000	40,000
21 days	....	27,400,000,000	80,000
22 days	....	30,400,000,000	1,490,000
23 days	....	30,700,000,000	11,600,000,000
24 days	....	9,900,000,000	1,000,000,000
25 days	....	46,000,000,000	3,600,000,000
26 days	....	44,100,000,000	4,400,000,000
28 days	....	42,000,000,000	16,500,000,000

* This table shows the actual plate counts and is represented in the geometric mean curve in Fig. 1.

Cutural Differentiation

The cultural differentiation of the normal flora required the use of aerobic and anaerobic cultural methods. Blood agar plates (six per cent) were used for this purpose, with MacConkey agar plates to differentiate the coliform organisms. After isolation of similar colony types, the usual biochemical and physical tests were utilized according to Bergey's Manual of Determinative Bacteriology (Sixth Edition). To store the cultures for further identification, plain tryptone and blood agar slopes along with the thioglycollate and trypticase agar media were used. No attempt was made to define the organisms as to species, but only as to family and genus. The greatest difficulty in classification was experienced with the family Lactobacteriaceae with a type of organism which morphologically resembled a Corynebacterium, but which with further work was placed in the genus Microbacterium. The greatest number of the gram-negative organisms were members of the family Enterobacteriaceae with the genus Escherichia predominating. Escherichia were present in 100 per cent of the 134 samples cultured and appeared in the "S" phase. A member of the genus Klebsiella was found in two samples or 1.5 per cent, while organisms of the genus Proteus were found in one sample. The total number therefore of non-lactose fermenting organisms of the family Enterobacteriaceae was eight, which represented 5.9 per cent of the total. Members of the genera Salmonella, Eberthella and Shigella were not recovered from any sample. It would therefore appear that in these animals the pathogenic types of non-lactose fermenting organisms are not a part of the normal bacterial flora and may appear only in infectious or nutritional disturbances. Gram-negative filaments were found in small numbers belonging to the genus Ristella and were strictly anaerobic. The remainder of the flora consisted of gram-positive types, all of which were members of the families Bacillaceae or Lactobacteriaceae. The genus Bacillus and genus Streptococcus were the predominating genera present with the Lactobacillus, Microbacterium and Clostri-

dium present in fewer numbers. The organisms belonging to the genus Clostridium, although morphologically resembling *Clostridium welchii*, did not produce stormy fermentation in litmus milk, but rather acid coagulation. The rumen types of bacteria were not predominant as part of the normal intestinal flora of these calves, excluding the possibility of the Enterococci as being of the rumen type rather than part of the normal intestinal flora.

THE ANTIBIOTIC ACTIVITY OF STREPTOMYCIN

Investigators have suggested the possibilities of the therapeutic use of streptomycin by oral administration to eliminate the gram-negative bacteria from the intestinal tract. Stebbins, Graessle, and Robinson[10] noted that when streptomycin was given orally, 60 to 80 per cent of the drug was recovered in a stable form from the faeces. Elias and Durno[11] recovered 64 per cent from the intestinal tract and suggested the possibilities of the use of the drug in enteric infections and surgery of the colon. Smith and Robinson[12] demonstrated the antibiotic effect of

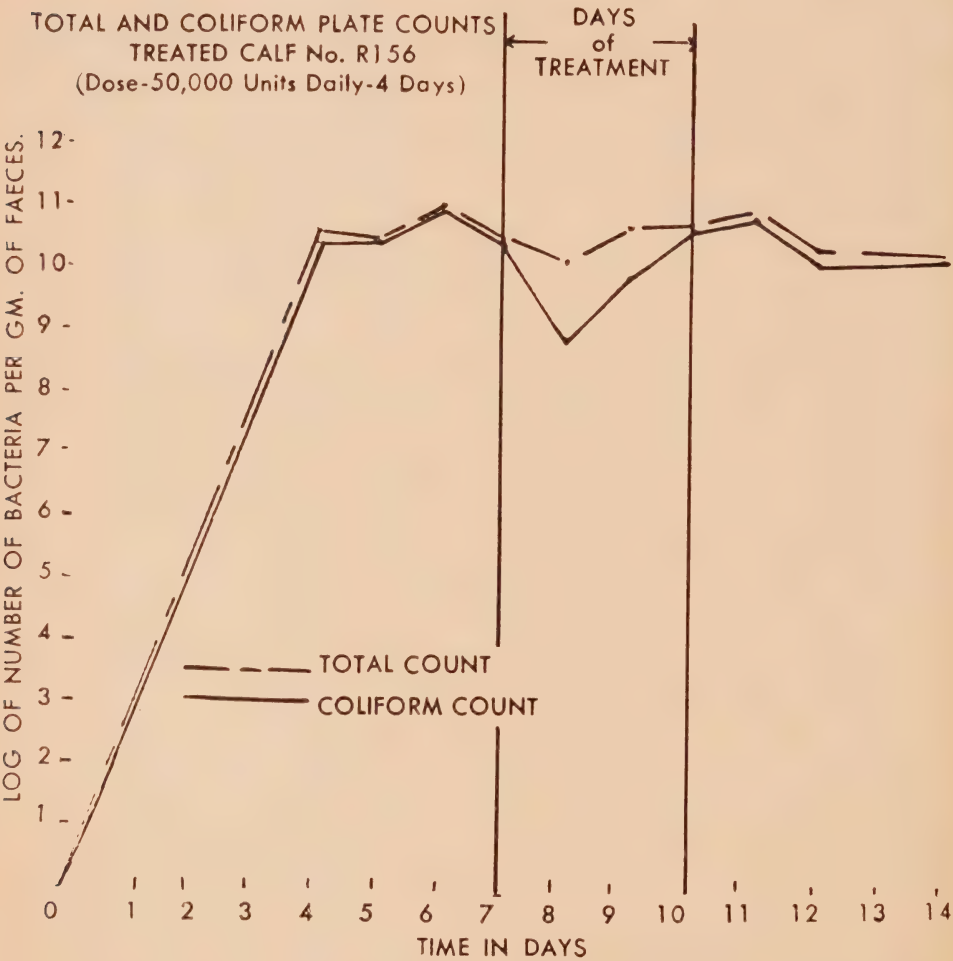

Fig. 2. This represents the total and coliform plate counts. The dosage is 50,000 micrograms daily per orum.

oral administration on the normal intestinal flora of mice and suggested its use in bacillary dysentery. The purpose of this phase of the investigation was to determine the efficacy of streptomycin hydrochloride on the normal flora of calves using various dosages of the drug administered orally.

EXPERIMENTAL PROCEDURE

In order to correlate the information derived from the treated calves with that from the normal calves, identical procedures were necessary. Microscopic differential counts, standard plate counts and cultural differentiation had to be performed in a similar manner. In addition, spot faecal assay levels and blood serum assay levels were carried out daily. A wide range of dosages of the antibiotic were selected — namely, 50,000, 150,000, 200,000, 500,000, 750,000, 1,000,000, 1,500,000 units or micrograms. The doses were given orally at daily intervals for four days. The streptomycin was dissolved in 10 cc. of sterile distilled water and given to the calf with a dose syringe. Blood was drawn from each calf daily and serum levels were determined by the serial dilution method. A strain of *Escherichia coli* sensitive to 0.06 micrograms of streptomycin was used as the standard strain. Plate counts, coliform and total, were carried out according to Standard Methods[13] by weighing one gram of faecal material and making a homogenous suspension in 10 cc. of sterilized saline. Centrifuged Seitz filtrates were made from the one in ten dilutions and this material assayed for streptomycin faecal levels.

RESULTS AND INTERPRETATION OF ORAL TREATMENT

Graphs and tables for only the pertinent data are included in this report.

Fig. 2 shows the curves for treated calf No. R156 and represents a daily dosage of 50,000 units for four days. The treatment was started on the seventh day. There is a slight drop noted in the total bacteria count with a greater drop in the coliform count. However, the decrease at this dosage is not significant and would indicate inadequate dosage.

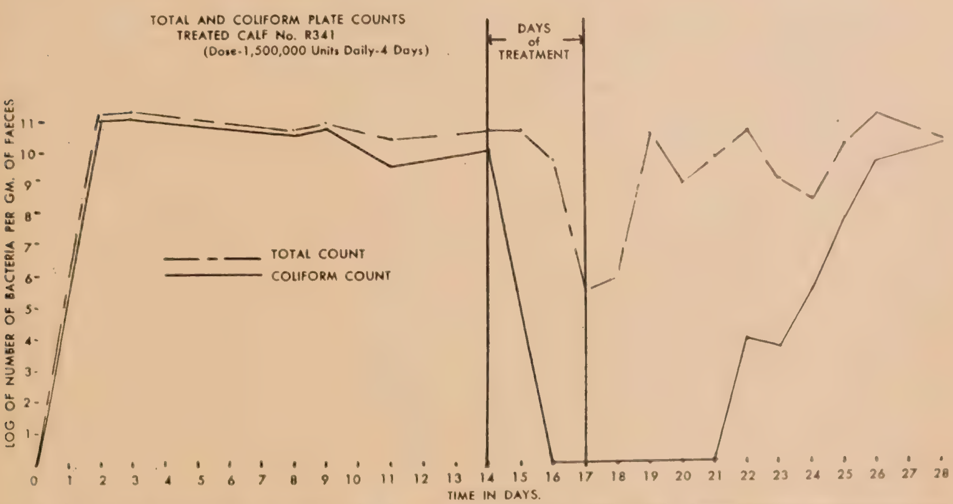

Fig. 3. This shows the effect of a daily dosage of 1,500,000 micrograms per orum on the normal bacterial flora. This would appear to be exaggerated dosage.

Fig. 3 represents a daily dosage of 1,500,000 units for four days and shows the complete elimination of the coliform group from the fourteenth day when

treatment was begun, until the twenty-second day when a return to normal has started. We find the intestine is completely devoid of the coliform group of organisms for a period of seven days, i.e. four days after dosage had been discontinued. There is a significant drop of 10^6 logarithms in the total count, this being due for the most part to the elimination of the coliform group. This graph would probably indicate needless overdosage or wasted antibiotic.

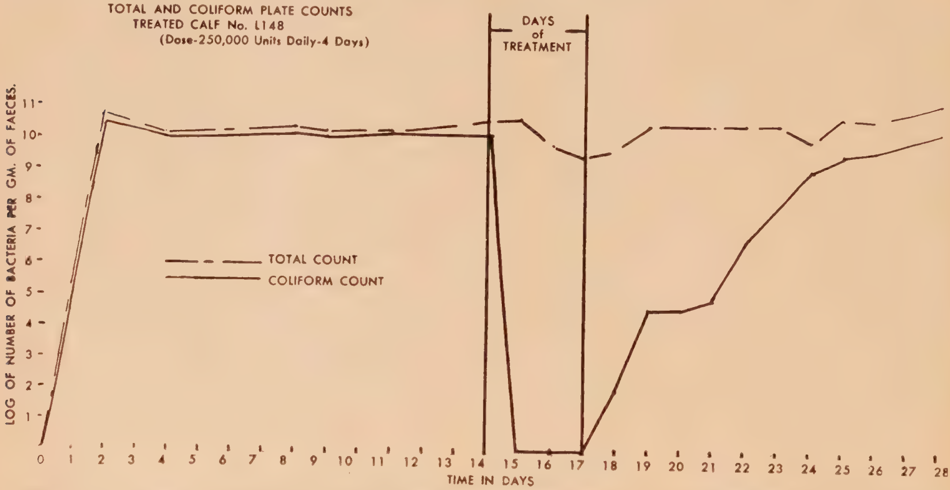

Fig. 4. A DAILY DOSAGE OF 250,000 MICROGRAMS FOR FOUR DAYS IS REPRESENTED ABOVE. THIS WAS ASSUMED TO BE THE MINIMAL THERAPEUTIC DOSE.

Fig. 4 represents what theoretically may be assumed to be the minimal therapeutic dose. The intestine is free from the coliform group for a period of seven days from the fourteenth day of age until the twenty-first day. There is only a slight tendency for the total count to decrease, which by cultural differentiation was shown to be due to the increased number of gram-positive enterococci which proliferated at the expense of the gram-negative group. No toxic reactions were observed in any of the treated calves during or following treatment. It was therefore suggested that this dosage of 250,000 units daily for four days be exposed to clinical trials. In the past year this has been carried out in co-operation with the Department of Medicine, and a note on the results will be found elsewhere in this report.

Cultural Differentiation

The treated and normal calves presented a similar bacterial flora until treatment was begun. During the period of treatment, the coliform organisms were eliminated except in the smaller non-inhibiting doses where a decrease in the total number was observed. The aerobic and anaerobic blood agar plates showed the presence of large numbers of enterococci with a few colonies of members of the genus Bacillus. A great proliferation of the enterococci appeared, enhanced by the absence of the coliform groups. Other cultural points observed were the disappearance of the genus Clostridium, the reappearance of the genus Microbacterium before treatment was completed, and the mucoid type of anaerobic streptococci, which was not found in the untreated calves. The possibility exists that a streptococcal infection could be induced by the use of the antibiotic, but this did not arise under the conditions of this experiment. It is also possible that nutritional upsets may occur due to treatment; however, the treated calves appeared normal at all times.

Spot Faecal and Blood Serum Assay Levels

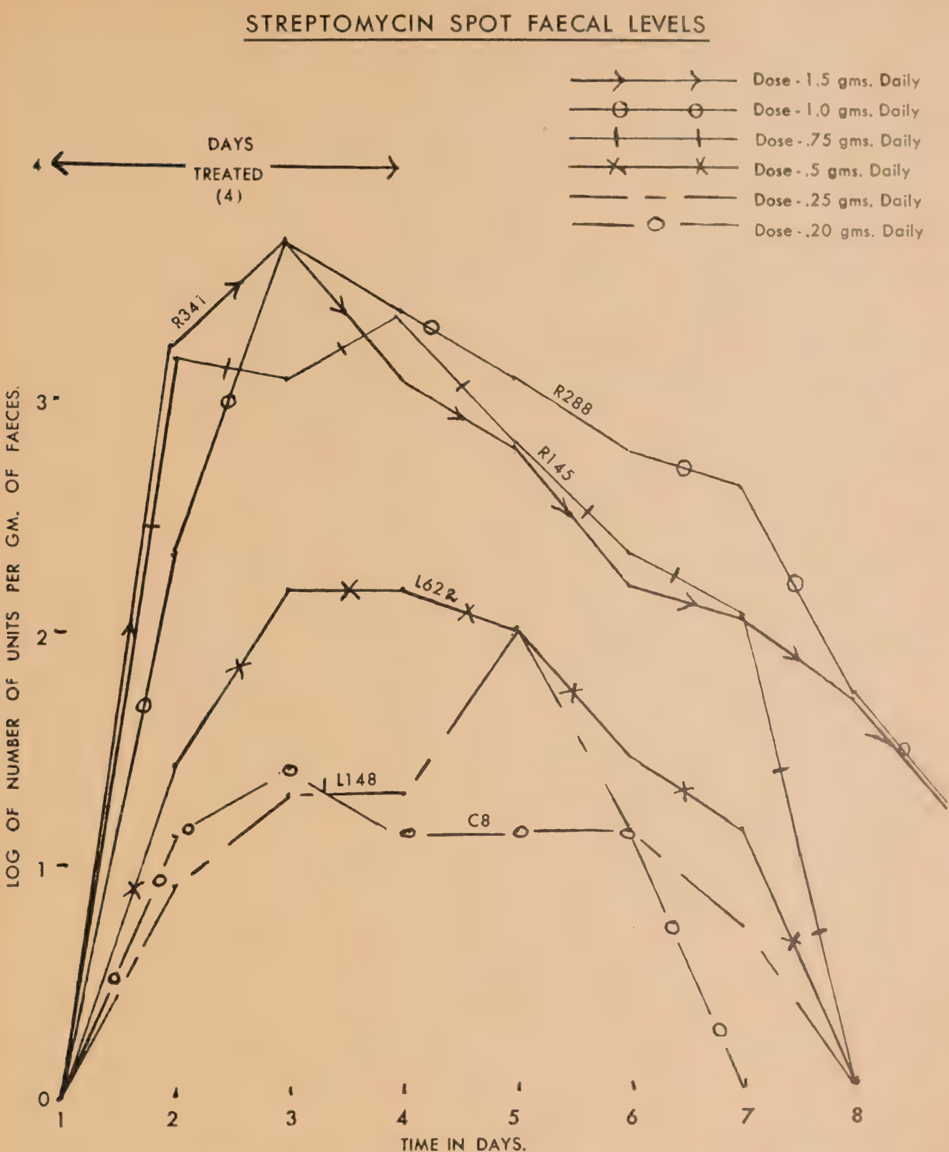

Fig. 5. SPOT FAECAL ASSAY LEVELS ARE ILLUSTRATED ABOVE. CALF L-148 REPRESENTS THE LEVELS TAKEN DURING THE PERIOD OF TREATMENT AND THIS DOSAGE OF 250,000 MICROGRAMS WAS CHOSEN FOR CLINICAL TRIALS. THIS CALF HAS AN ASSAYABLE FAECAL LEVEL FOR A PERIOD OF EIGHT DAYS.

Fig. 5 represents the spot assay faecal levels of the treated calves. Due to the fact that these levels are only spot levels and not taken from a homogenous sample over the whole 24-hour period, much significance cannot be attached to them. However, it was found that the highest faecal levels were obtained on the third day of treatment. The highest level obtained for the theoretical therapeutic

dose was 108 units per gram of faeces. An assayable level was present at this dosage for a period of seven days or four days after treatment was completed. Blood serum levels taken during and after the period of treatment showed a minimum of 1.5 units per cc. of serum for the daily dose of 250,000 units. On the second, third, and fourth days a level of 3.0 units per cc. was maintained. The highest serum level obtained for the larger doses of 1,000,000 and 1,500,000 units was 6.0 units per cc. This agrees with the findings of Zintel *et al*[14] who reported that the oral administration of 1.0 gram per day gave serum levels varying from 1.0 to 6.0 units per cc.

The Inhibitory Substance in Normal Calf Serum

The control series on the serum of each calf indicated the presence of an inhibitory substance in normal calf serum. The blood serum levels were corrected for this factor. Whether the inhibitory substance is due to the presence of agglutinins derived through the colostrum is not known. If this were so, then at the half dilution, enough agglutinins are present to agglutinate with the number of test organisms present. Whether this substance is found in the serum of the newborn calf is not known. Further work would be necessary to obtain any definite information about this factor.

DISCUSSION AND SUMMARY

The microscopic differential count (see Table I) shows that the normal bacterial flora consists of 57 per cent gram-negative organisms and 53 per cent gram-positive organisms. Acid-fast types do not appear to be present in the first few weeks of life. Of the total of 57 per cent of the gram-negative flora, the rods and coccobacilli represent 56.5 per cent which are predominantly members of the family Enterobacteriaceae. This presents rather a sharp contrast to the bacterial flora of calves suffering from "white scours", when the flora is almost completely gram-negative and is found on culture to be the mucoid phase of *E. coli*. Pure cultures of these organisms obtained from clinical cases have been maintained and further work is being done in this field. The plate differential counts showed the presence of very large numbers of bacteria represented arithmetically by billions of bacteria per gram of faeces. The geometric mean curve shows a great variation in the number of bacteria present in samples taken daily. From Fig. 1 we find that for the first 26 days there is an inconsistent rise or fall of the number of bacteria present. After this period there is a tendency for the numbers to decrease slowly, and this may be an indication of a trend towards equilibrium, which is not apparent in the first eight weeks. However, sudden invasion of large numbers of bacteria into the intestine of the new-born calf is quite apparent. It has been shown previously by many workers that the foetus *in utero* is bacteria-free, and it is reasonable to assume that the presence of abnormal types of bacteria in the intestine would enhance the risks of disease.

Cultural differentiation of the normal flora showed the coliform group to predominate with the enterococci as the next largest group. The non-lactose fermenters do not appear as part of the flora and the members of the genus Clostridium are not of the pathogenic type.

The cultural differentiation during the period of treatment indicated the antibiotic activity of streptomycin against the gram-negative coliform groups. Above 200,000 units daily the intestine was devoid of the coliform organisms for a number of days in proportion to the increased dosage. An appreciable drop in the total bacterial count was not significant due to the increase in the number of enterococci proliferating in the absence of the coliform group. Nutritional upsets

were not evident in the treated normal calves under this condition of disequilibrium.

Graphs are presented showing the effect of streptomycin given orally on three normal flora with the complete elimination of the coliform types at specified dosages. No toxic reactions were evident in the normal calves even at the largest dosage of 1,500,000 units or 15,000 units per pound of body weight daily. The recommended dosage represents 2,500 units per pound of body weight.

After correlating the data obtained, it is suggested that 250,000 units or one-quarter gram of streptomycin be given daily for four days for both controlling and treating "white scours" in calves. This was felt to be the minimal therapeutic dose, but under field conditions may have to be increased. At the present time, field experiments are being carried out in conjunction with the Department of Medicine and the Department of Pathology.

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CASE REPORTS FROM THE SMALL ANIMAL CLINIC

James Archibald, D.V.M.

SURGICAL CORRECTION OF INTUSSUSCEPTION

Case No. 3262

Cocker, male, two years of age.

History and Symptoms

The dog was presented to the Small Animal Clinic on February 17, 1950. It was very weak, greatly dehydrated and had been straining with intermittent diarrhoea for 10 days. The temperature was subnormal and there were shreds of bloody mucus on the thermometer. On abdominal palpation a firm mass was felt.

A tentative diagnosis of intussusception was made.

Before the dog was X-rayed, it was given barium orally. As pointed out by the Radiology Department, this was an error; when intussusception occurs, the proper technique is to administer the barium per rectum. This results in a doughnut-shaped ring of barium at the site of intussusception, thus affording a means of positive diagnosis. However, the films were thought to be sufficiently diagnostic to warrant surgical intervention.

Treatment

Because of the poor condition of the dog, it was decided to anaesthetize the animal with an epidural injection of 5 cc. of a mixture of procaine hydrochloride and epinephrine.

The animal was prepared for surgery in the usual manner.

An incision was made in the flank, and the telescoped portion of bowel was withdrawn from the abdomen. A portion of ileum and the caecum had invaginated into the large intestine for a distance of six inches. Although the invagination was pale and appeared quite friable, the intussusception did not seem to have been of long duration. It was decided to attempt reduction without resecting the intestine. This was done by gently "milking" the invaginated portion of small intestine from the large. This was successful until the primary invagination was reached, at which point the wall of the intestine proved to be too brittle, and broke.

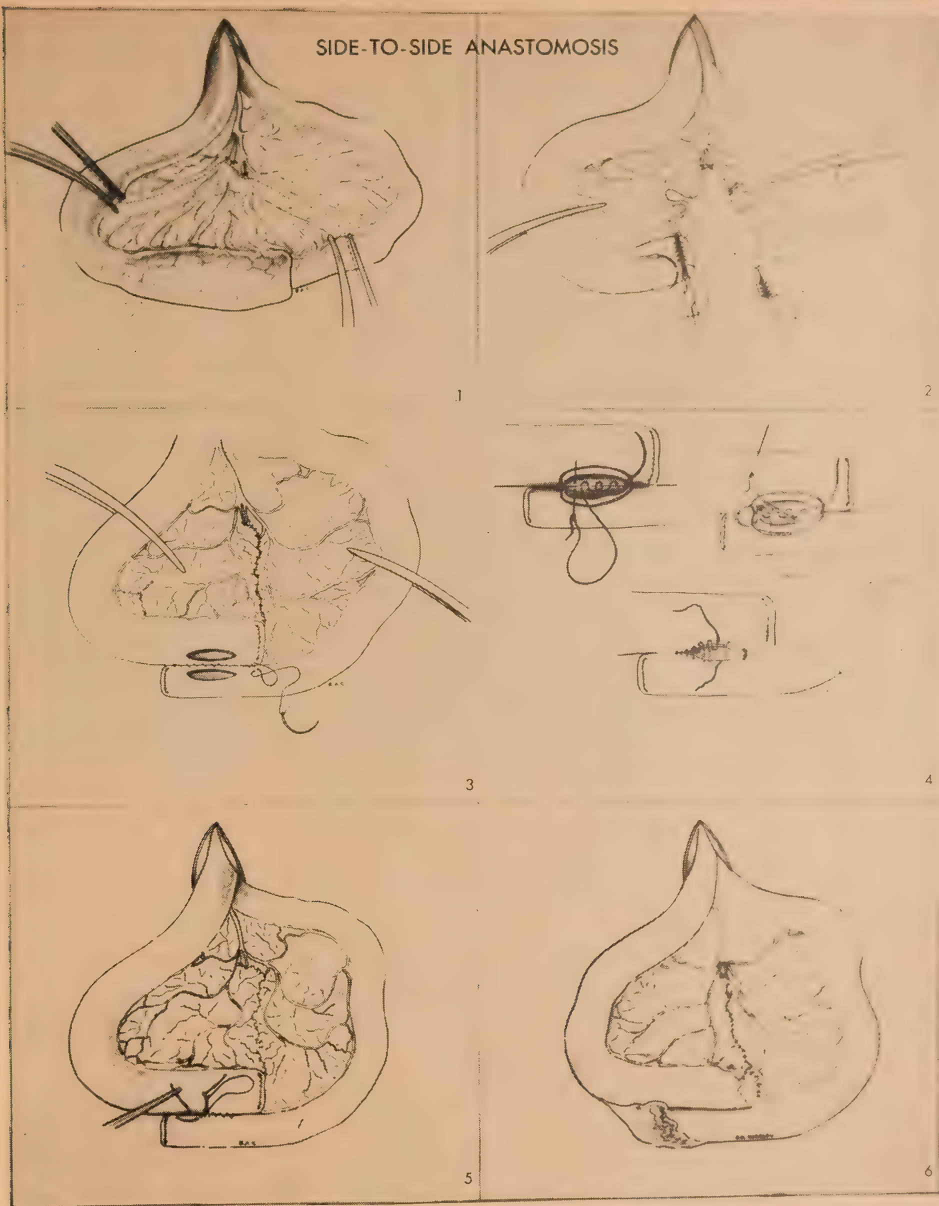
The break in the intestine was so extensive that it was decided to remove the entire portion which had been invaginated. Intestinal clamps were placed across the intestine at points sufficiently distant from the section to be removed to (1) prevent seepage of intestinal contents and (2) remove these portions from the site of operation. Kocher clamps were placed on the intestine at the points at which it was to be incised. (See Fig. 1).

The vessels in the mesentery were firmly ligated and the exposed intestine was completely packed off. The intestine was then divided between the two Kocher clamps and the mesentery removed with it. The scalpel actually shaved the intestine from either clamp. The clamps were carefully wiped with gauze. Both ends of the bowel were closed by the Parker-Kerr method (see Fig. 2).

The two pieces of intestine were laid in an iso-peristaltic position and joined together by a row of simple continuous sutures. Incisions of equal length were made in each of the sections of bowel (see Fig. 3). The anastomosis was made with a Connell suture (see Fig. 4). When the anastomosis was completed, an interior row of continuous sutures was laid (see Fig. 5). The intestinal clamps were removed.

The site of the operation was covered with a piece of mesentery tacked to the intestine (see Fig. 6). The rent in the mesentery was closed by interrupted sutures. The packing was removed and the bowel replaced in the abdomen. One gram of streptomycin was placed in the abdomen. The abdomen was closed in three layers.

Recovery was uneventful and the animal was discharged from the clinic in seven days.



Figs. 1 to 6. SIDE TO SIDE ANASTOMOSIS.

Remarks

The reason for using side to side anastomosis is obvious in that (1) the two portions of intestine were of different diameter, (2) the size of the stoma made in a side to side anastomosis is left to the discretion of the operator, and (3) the subsequent contraction of cicatricial tissue at the site of anastomosis with a large stoma is not so likely to cause a later constriction in the digestive tract.

Fig. 1. X-RAY SHOWING CYSTIC CALCULI IN BLADDER OF A DOG.

REMOVAL OF CYSTIC CALCULI

Case No. 2451

Cocker, female, five years of age.

History and Symptoms

This dog was admitted to the Clinic for examination on December 21, 1949. The owner reported that the animal appeared to be straining considerably when urinating. The condition was thought to have become progressively worse during the preceding two weeks.

Upon examination, the dog appeared to be in a reasonably good general condition. The temperature and mucous membranes were normal. A faecal examination established the presence of whipworms. Digital manipulation showed the bladder to be enlarged, and upon feeling crepitus a tentative diagnosis of cystic calculi was made. This was verified by x-ray. (See Fig. 1).

Following are the results of a routine blood analysis:

Leukocyte count	15,300
Neutrophils — 58%	Lymphocytes — 21%
Stab cells — 15%	Monocytes — 4%
	Eosinophils — 2%

The neutrophilia present was suggestive of a bacterial infection. A microscopic examination of swabs taken from the vagina showed gram-positive diphtheroid rods. Corynebacteria were not identified on culture.

Treatment

On the following day, the animal was prepared for a cystotomy. A ventral midline incision was made and the bladder exposed. The organ was found to be extremely congested and a significant amount of haemorrhage followed its incision. The haemorrhaging vessels in the wall of the bladder were ligated before proceeding with the rest of the operation.

The calculi found in the bladder were multiple and faceted. These were removed and the bladder was irrigated with normal saline several times to ensure that no calculi remained.

The bladder incision was closed using a continuous Czerny-Lembert technique. the peritoneum, abdominal muscles, and anterior fascia were closed together using chromic gut No. 1 and a continuous suture. Before closing the abdominal cavity, 200,000 units of crystalline penicillin in 10 cc. of sterile distilled water were injected into the peritoneal cavity. The skin was closed with No. 1 chromic gut and interrupted vertical mattress sutures.

Post-operative progress was rapid and uneventful. The temperature remained normal, and on the fifth day after the operation, the dermal sutures were removed and the animal discharged.

Addendum

This dog was readmitted to the Clinic five months after it had recovered from the cystotomy. The temperature was 104.4°, and the animal was depressed with anorexia, vomiting, and diarrhoea. A tentative diagnosis of peritonitis was made. Enemas of normal saline were administered, together with kaolin and bismuth orally. Intramuscular injections of penicillin were also given. In three days the animal's condition had deteriorated and an exploratory laparotomy was performed.

It was found that the left kidney had atrophied, the right kidney was enlarged, and the renal capsule and sublumber fascia enclosed a massive haematoma. Euthanasia was performed.

On post-mortem examination, the right kidney was found to be in the advanced stages of pyelonephritis. Only a thin capsule of renal cortex remained, and this was enclosing a large quantity of purulent material.

ECTOPIA CORDIS IN A BOVINE

J. H. Ballantyne, D.V.M.

The Shorthorn heifer with a congenital displacement of the heart known as ectopia cordis, which was described by McIntosh in a previous report[1], remained at the Ontario Veterinary College until December, 1949, when she was brought to the Department of Anatomy for dissection. During the three years she was kept at the College, her external appearance remained about the same as described by McIntosh. She had grown fairly well, weighing approximately 750 pounds when killed.

The animal was prepared for dissection in the usual manner, except for the addition of a 20 per cent suspension of barium sulphate in the embalming fluid. It was thought that radiographs of the cervical and thoracic regions. showing the

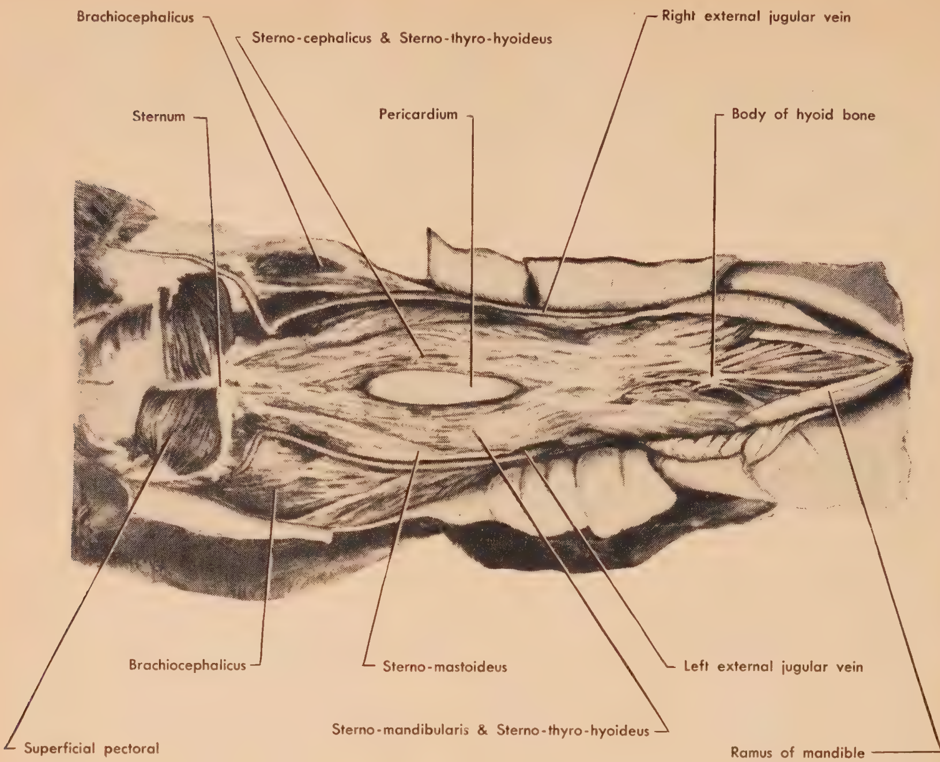


Fig. 1. THE VENTRAL CERVICAL MUSCLES AND EXPOSED PART OF THE PERICARDIUM.

position of the vessels, would aid in dissection. The x-ray equipment could not penetrate these areas, however, and satisfactory plates were not obtained. Some excellent pictures of the extremities were secured.

DESCRIPTION OF THE CASE

The skin was removed from the mandibular and ventral cervical regions, exposing a thick layer of fat. Ventrad to the heart, this layer was 15 to 20 cm. thick. Many lymph and haemolymph nodes were scattered throughout. The adipose tissue was carefully dissected away from the underlying muscles and pericardium. Pressure from the heart had separated the muscles in the midline so that a portion of the pericardium was visible. The exposed area was 25 cm. long and 5 cm. wide. Its caudal extremity was 15 cm. anterior to the sternum.

The entrance to the thoracic cavity and the lower neck was wider than normal. The first ribs were 16 cm. apart and the neck was 23 cm. thick in the region of the heart.

The Muscles

The ventral cervical muscles, sterno-cephalicus and sterno-thyro-hyoideus were quite distorted (see Fig. 1). Their fibres were united and mixed to such an extent that, except for their insertions, they only slightly resembled those found in the normal bovine.

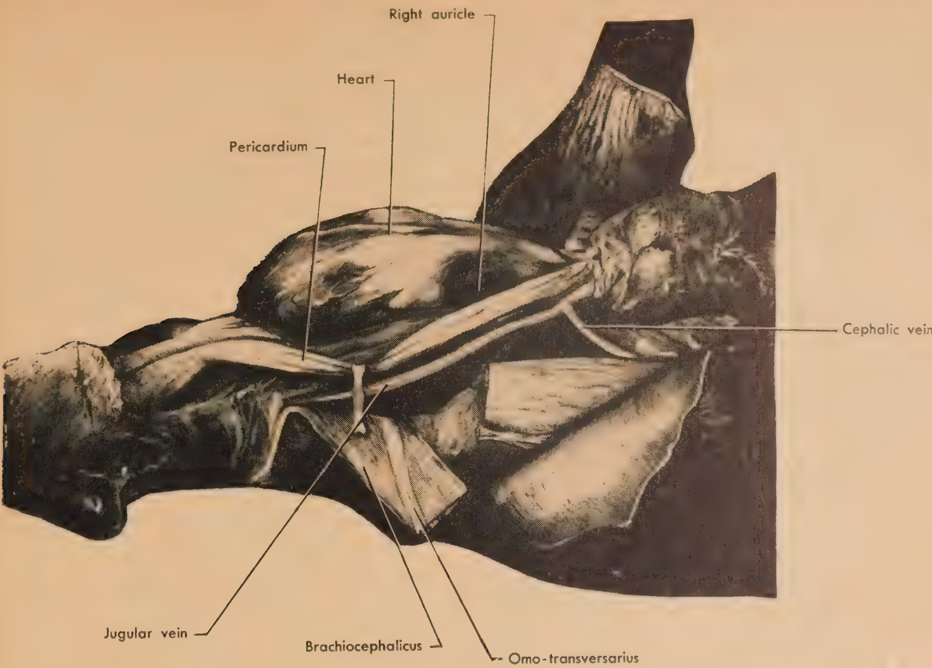


Fig. 2. THE HEART AFTER REFLECTING THE PERICARDIUM.

The right sterno-cephalicus muscle had a narrow tendon originating from the manubrium. About 18 cm. anteriorly it gradually became fleshy and continued to its insertion on the mastoid process and ramus. Another part of this muscle arose from the fascia over the brachiocephalicus and was also attached, by fascia, to the first rib and its cartilage. This fascia acted as a tendon and was pierced by the external jugular vein just anterior to the first rib. It then continued forward, medial to the vein and brachiocephalicus muscle, and inserted on the ramus and fascia over the masseter muscle. This muscle was closely fused medially with the sterno-thyro-hyoideus.

The left sterno-cephalicus muscle more closely resembled the normal in its origin from the manubrium. It divided into two parts 15 cm. craniad to its origin. The part terminating on the mastoid process was close to normal except that it was fused to the medial surface of the brachiocephalicus muscle, and the jugular vein passed through it. The medial portion was intermingled with the sterno-thyro-hyoideus to within 10 cm. of its insertion, which was close to normal.

The sterno-thyro-hyoideus muscles were difficult to distinguish. There were definite muscle bundles inserting on the body of the hyoid bone, and several small slips going to the lamina of the thyroid cartilage. Other than these, the muscles seemed to be fused with the sterno-cephalicus.

The Pericardium

The muscles were carefully dissected from the underlying structures and transected, exposing all of the pericardium. This was a long cocoon-shaped sac, somewhat pointed at each extremity. It was 40 cm. long, 15 cm. deep at the middle of the neck, and 16 cm. wide at its widest point. The fibrous layer was continued craniad by fascia, which in places was largely elastic. It joined the laryngeal

fascia and the fascia beneath the mandibular salivary gland. A small bundle of muscle fibres, one cm. wide, extended forward from this fascia at the cranial extremity of the pericardium. Ten cm. from its origin this muscle divided, one half passing outward to attach to the thyroid cartilage of the larynx, and the other going to the body of the hyoid bone at about the middle. This was probably a part of the sterno-thyro-hyoideus muscle. There were also strong fascial connections between the fibrous pericardium and the dorsal part of the anterior extremity of the sternum, the cervical muscles and vertebrae.

The pericardium was opened on the midventral line exposing the serous layer and the heart (see Fig. 2). The serous layer formed two cranial pouches, a right one 5 cm. deep, and a left one 2.5 cm. deep. These extended upward and forward in the extension of the fibrous pericardium toward the throat. The fibrous layer was lined by the serous layer as far back as the manubrium ventrally, while dorsally the serous layer formed an upward extension around the great vessels.

The Heart

The heart will be described as found in the specimen reported in this article. In order to compare it with the normal heart, comparable borders and surfaces will be noted.

In this specimen, the heart had a base and apex, dorsal and ventral surfaces, and right and left borders. The base was directed caudad and lay just in front of the thoracic inlet. The aorta emerged from the centre of the anterior dorsal part, with the right auricle to its right and the pulmonary artery to its left. The ventral three-quarters of the base was occupied by the right and left atria. The apex had a rounded blunt point lying below the middle of the third cervical vertebra. The dorsal surface (anterior border of normal heart) was nearly flat from side to side and slightly convex from front to back. The left longitudinal groove crossed this surface obliquely near the apex. The conus arteriosus formed a distinct elevation on the left caudal part of this surface. Above the pericardium, the dorsal surface was related to the brachiocephalic, right and left common carotid and part of the right brachial arteries, the trachea, oesophagus, and vagi and sympathetic nerves.

The ventral surface (posterior border of normal heart) was convex in both directions. It was crossed by two large central veins which diverged in their forward course toward the apex.

The right border was convex antero-posteriorly, and flattened dorso-ventrally. The right longitudinal groove passed forward along the junction of this border and the ventral surface. Near the apex it turned dorsad and met the left groove 3.5 cm. from the apex.

The left border was also convex longitudinally, and slightly convex dorso-ventrally. It was nearly twice as wide as the right border. The left longitudinal groove began in its dorso-caudal part, passed forward, and about half-way to the apex turned obliquely across the dorsal surface.

A thick layer of fat was present in the region of the shallow coronary groove.

The right atrium was a cone-shaped structure occupying most of the right half of the base of the heart. It extended directly caudad from the right atrio-ventricular orifice to the post-cava. The cranial half of its dorsal surface was occupied by the right auricle. The apex of the auricle extended to the mid-line in

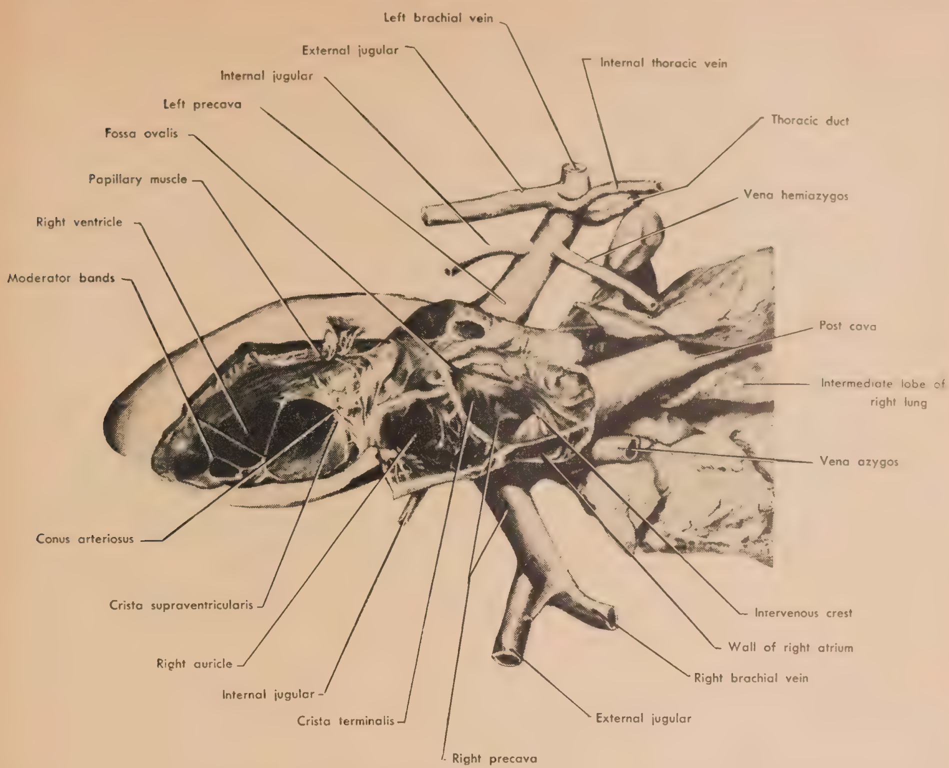


Fig. 3. Interior of right atrium and ventricle. Heart was opened along right border.

front of the aorta. A deep sulcus separated the auricle caudally from a dome-shaped diverticulum. This pouch was 5.5 cm. in diameter and covered with circular muscle fibres. Four veins emptied into the dorsal surface of this diverticulum—the internal jugular in front, then a large common trunk for the right brachial, external jugular and internal thoracic which entered below and posterior to the jugular. This large vessel and the pouch will be called the right precava as they received all the veins from the right side that normally enter the precava. The vertebral vein and vena azygos entered one cm. behind the large trunk. The post-cava entered the apex of the atrium 11.4 cm. caudad to the right ventricle. A large vessel, the left precava, carrying all the blood from the left side that normally enters the precava, passed below the pulmonary veins and entered the atrium about the middle of the left side. Muscle fibres from the atrium extended out 6 cm. on the left precava and back 4 cm. on the post-cava.

The cavity of the right atrium is shown in Figure 3. The interior of the auricle seemed normal. The crista terminalis was well marked but the intervenous crest was not distinct. Of the four openings into the dome-shaped part of the right precava only the one to the vertebral vein was protected by a valve. The fossa ovalis was located about the middle of the medial wall. It was 1.2 cm. deep. The left precava and great coronary vein entered just below it.

The right ventricle (see Fig. 3) formed all of the dorsal half of the ventricular mass except for a small part at the apex and a triangular area along the anterior half of the left border. It was a flattened triangular-shaped cavity 14.5

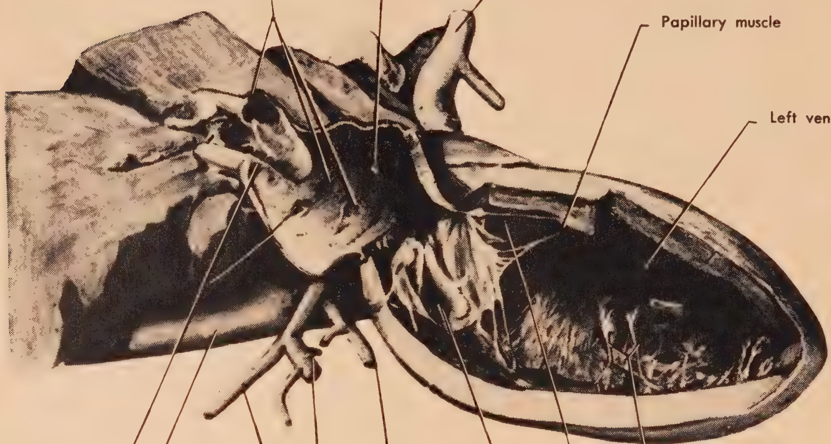


Fig. 4. Interior of left atrium and ventricle. A part of the ventral wall has been removed.

cm. long from the pulmonary orifice to its apex, and 10 cm. wide at its widest point. The apex of the ventricle was 5.5 cm. from the tip of the heart. The interventricular septum or floor of the right ventricle was roughly horizontal in position. It extended from the ventral part of the right border to the dorsal part of the left border. One large and five small moderator bands ran from this septum to the dorsal wall. Three papillary muscles were present—a large and a small one on the septal wall and a large one on the right border of the ventricular wall. The conus arteriosus was flattened dorso-ventrally and formed a distinct prominence on the left dorso-caudal surface of the heart. The right atrio-ventricular and pulmonary valves appeared normal.

The left atrium (see Fig. 4), a tubular-shaped structure extending 14 cm. caudad from the base of the left ventricle, was thin-walled and covered with diagonally running muscle fibres. Dorsally it was related to the pulmonary artery; medially it was related to the aorta in front, the right atrium in the middle and the post-cava behind. The left precava crossed the centre of its ventral surface. The left auricle extended forward below the pulmonary artery with its apex opposite the pulmonary orifice. A large vein returning blood from both the right and left diaphragmatic lobes and the intermediate lobe of the right lung entered the most caudal part of the atrium. A little farther forward, the vein draining the left

apical lobe entered the left surface of the atrium. Directly opposite, the atrium received two vessels from the right lung. These drained the apical and cardiac lobes of the right lung. The interior was smooth except for the openings of the vessels mentioned and a shallow diverticulum on the septal wall slightly behind the fossa ovalis of the right atrium. The interior of the auricle seemed normal.

The left ventricle (see Figs. 4, 5, and 6) formed all of the ventral surface, left border, apex, and a small area at the cranial end of the dorsal surface of the ventricular mass. The cavity was flattened dorso-ventrally with the septal wall forming the roof. The left atrio-ventricular orifice was also flattened and extended the full width of the base. Two papillary muscles were present—a large one on the right border of the ventricular wall and a smaller one on the left border. There were three moderator bands.

The Pulmonary Artery

The pulmonary artery (see Fig. 8) passed in a horizontal plane 11 cm. caudad, then divided into right and left branches. It was related ventrally to the left atrium and medially to the first part of the aorta. It then curved slightly to the right and continued caudad to the left of the trachea. The vessel was quite flat and was 5.2 cm. wide and 2.3 cm. deep. Nine cm. from the conus arteriosus, the ligamentum arteriosum left the dorsal surface of the pulmonary artery and passed up to the left surface of the aorta 4 cm. above.

The Aorta and Its Branches

The aorta (see Fig. 7) emerged from the centre of the anterior part of the base of the heart. It passed dorsad and slightly caudad for 4 cm., at the end of which the large brachiocephalic artery left its anterior surface. The aorta then continued back at a more acute angle, for a distance of 6 cm., to the first rib. This part was displaced to the left by the oesophagus. The left brachial artery and ligamentum arteriosum left the aorta in front of the first rib. From the thoracic inlet the aorta passed posteriorly in a normal manner.

The right coronary artery left the aorta above the anterior cusp of the aortic orifice. It immediately divided, one branch passing forward to supply the dorsal surface of the right ventricle, while the other branch passed to the right in the coronary groove giving off branches to the right atrium. On reaching the right border this branch turned forward in the right longitudinal groove.

The left coronary artery (see Fig. 5) was three times as large as the right one. It left the aorta above the left posterior cusp and passed to the left below the pulmonary artery and anterior to the left auricle. It divided at the coronary groove into descending and circumflex branches. The former followed the left longitudinal groove forward on the left border and dorsal surface and anastomosed with the vessels in the right groove. The circumflex branch followed the coronary groove down and across the right longitudinal groove, where it turned forward with a branch of the right artery. During its passage from left to right it gave off fairly regular branches to the left atrium and ventricle.

The brachiocephalic artery (see Figs. 7 and 8) passed forward, curving slightly to the right, for a distance of 7 cm. and finally terminated in three branches. The left branch, the left common carotid, passed forward and upward above the thymus gland, reaching the left border of the oesophagus ventral to the third cervical vertebra. The right common carotid was the middle branch. It

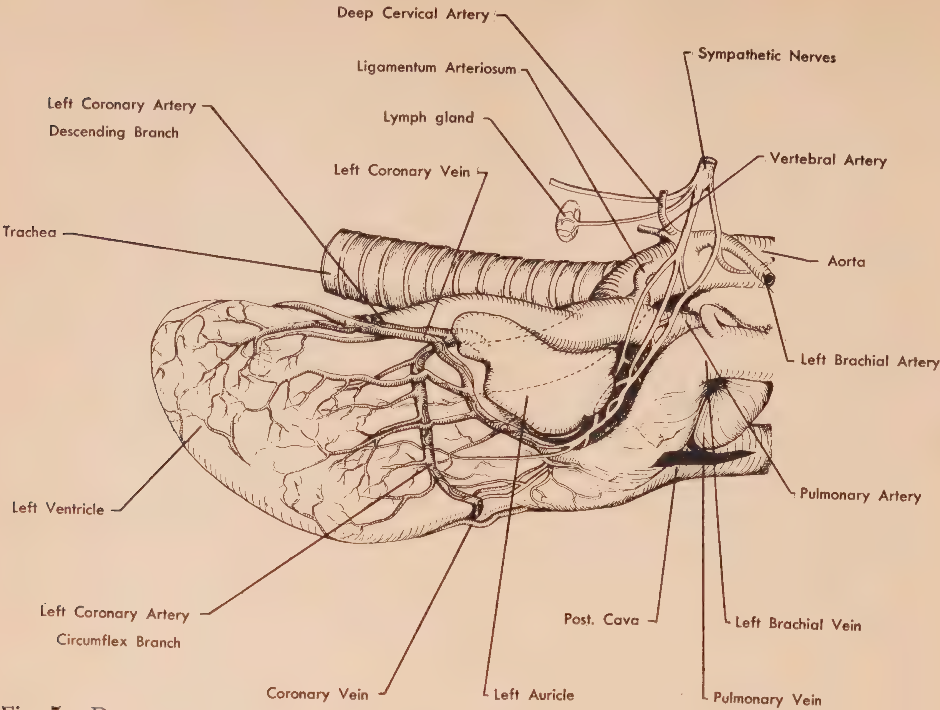


Fig. 5. Diagram illustrating arrangement of vessels and sympathetic nerves of left border of heart.

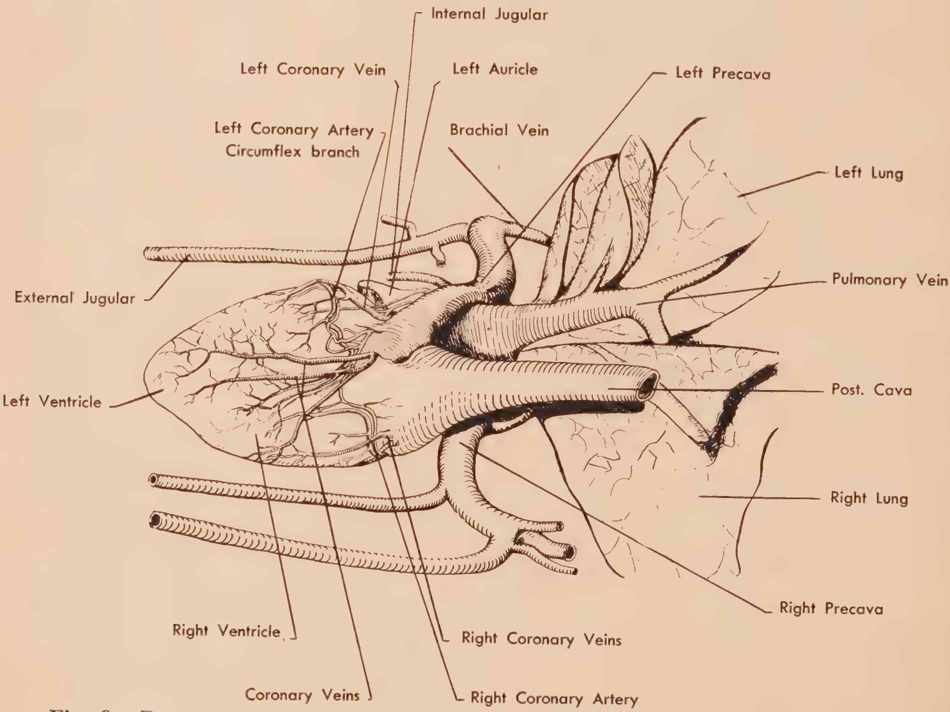


Fig. 6. Diagram of heart showing vessels on right border and ventral surface.

passed forward and upward above the thymus gland, reaching the left border of the oesophagus ventral to the third cervical vertebra. The right common carotid was the middle branch. It passed forward and outward, crossing the ventral surface of the oesophagus and trachea about the middle of the neck. The right brachial, right branch, turned back at an acute angle, and crossed below the oesophagus and trachea on its way to the sternal end of the first rib. This part was 17 cm. long and had four branches.

The first branch was a common trunk for the vertebral and deep cervical. It left the dorsal surface of the right brachial as it emerged from under the trachea. The inferior cervical was given off one cm. further back. The internal thoracic left the brachial at the first rib, passed medial to the rib, and entered the thoracic cavity. One cm. further out the external thoracic was given off. The brachial then continued a normal course.

The brachiocephalic artery and first parts of its branches were noticeably flattened by the heart pressing them against the longus colli muscles and cervical vertebrae.

The left brachial (see Fig. 8) left the dorsal surface of the aorta anterior to the first rib. It passed down to the middle of the medial surface of the first rib where it gave off the internal thoracic. It then turned around the cranial border of the rib, gave off the external thoracic and continued a normal course. The vertebral, deep cervical and subcostal arteries left the brachial at its origin. The thoracic branches of the aorta appeared normal.

The Veins

The great coronary vein (see Figs. 5 and 6) followed the left longitudinal groove, passed below the left auricle, and emptied into the left precava. It seemed to drain the left half of the heart. The right coronary entered the right atrium just caudad to the atrio-ventricular orifice. It drained the right border and the right half of the dorsal surface. Two smaller veins returned the blood from the centre of the ventral surface and emptied into the left precava.

The veins entering the right and left precava were close to normal except for their terminal parts. These have been described with the right and left precava. The termination of veins in this animal was somewhat similar to that found in the rat and rabbit. The normal anastomoses of the left and right precardinals and subsequent formation of the anterior precava in the embryo evidently did not occur.

The Nerves

The right vagus nerve (see Fig. 7) started down the neck dorsad to the right carotid, passed medial to the thyro-laryngeal vein, then turned toward the ventral surface of the trachea which it reached opposite the sixth cervical vertebra. It then passed under the right brachial artery, continued caudad beneath the trachea and medial to the deep cervical vessels and azygos vein. A short distance inside the thoracic cavity it became related to the lateral surface of the oesphagus. It then passed up and back meeting the left vagus on the dorsal surface of the oesophagus under the ninth thoracic vertebra.

The right recurrent nerve left the vagus near the origin of the right brachial artery. It looped around this vessel and passed up the neck close to the carotid artery. Many small branches left the vagus and passed to the base of the heart,

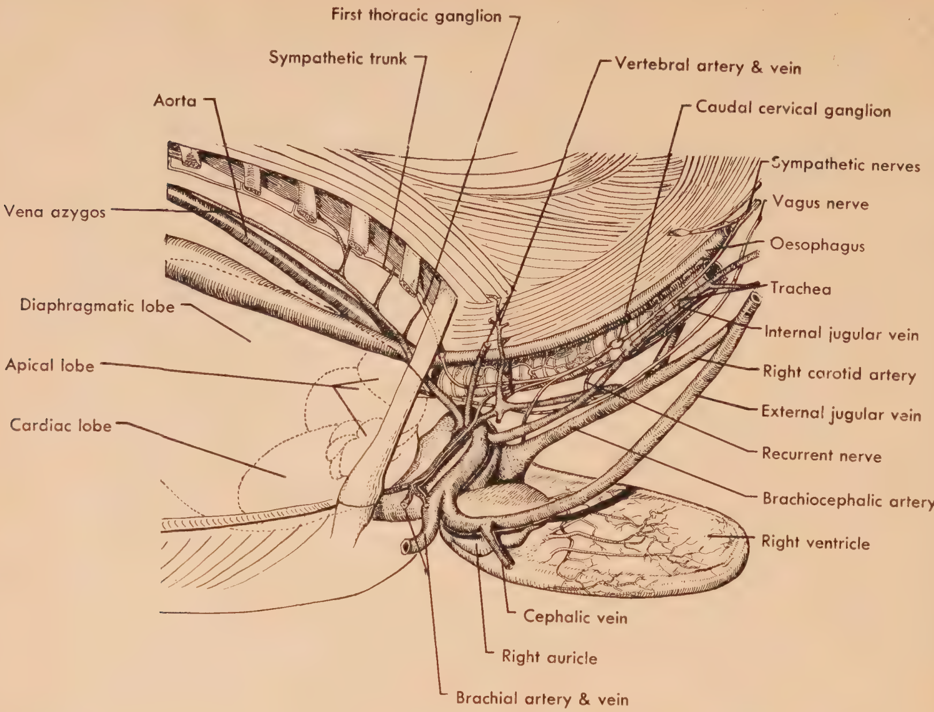


Fig. 7. DIAGRAM OF RIGHT SIDE SHOWING HEART AND RELATED STRUCTURES IN LOWER CERVICAL REGION.

oesophagus and trachea. Opposite the first rib, a branch passed beneath the oesophagus to join a branch from the left vagus. This was a part of the pulmonary plexus.

The left vagus nerve (see Fig. 8) passed down the neck ventrad to the internal jugular vein. Opposite the sixth cervical vertebra it crossed the medial surface of this vessel, continued back along the left surface of the aorta and became related to the oesophagus opposite the third rib. Here it detached a branch which passed under the oesophagus to join a branch from the right vagus nerve. The left vagus then continued up and over the oesophagus to join the right.

The left recurrent nerve left the vagus below the left brachial artery, passed around behind the aorta and continued up the neck along the lateral surface of the oesophagus.

The vagi nerves did not divide into dorsal and ventral oesophageal nerves until the hiatus oesophagus was reached.

The right sympathetic nerve (see Fig. 7) ran down the neck with the vagus as far as the third cervical vertebra. At this point they parted, the sympathetic gained the upper border of the internal jugular vein and continued back along the right surface of the trachea. It crossed the medial surface of the vertebral vessels and entered the first thoracic ganglion medial to the first rib. The caudal cervical ganglion was located on this trunk about the middle of the neck.

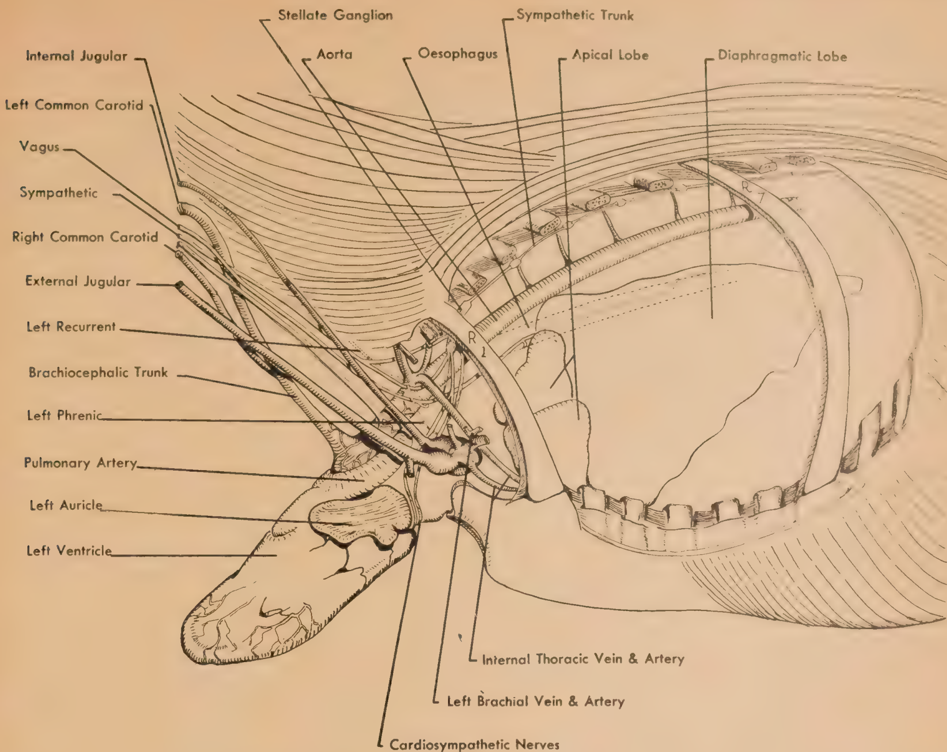


Fig. 8. DIAGRAM OF LEFT SIDE SHOWING HEART AND RELATED STRUCTURES IN LOWER CERVICAL REGION.

It was 9 mm. long, 4 mm. wide and 1 mm. thick. The cranial cardio-sympathetic nerve left the trunk behind the caudal cervical ganglion and passed down to the aorta and great vessels. The middle and caudal cardio-sympathetic nerves left the first thoracic ganglion at the first rib. These small twigs passed down in front of the vena azygos.

The cervical part of the left sympathetic nerve (see Fig. 8) consisted of two separate nerves. The larger one followed the vagus as far as the aorta. Here it divided, one half passing below the brachial artery before joining the stellate ganglion medial to the first rib. The other half passed medial to the vertebral and deep cervical vessels, then joined the ganglion. The other trunk left the vagus about the middle of the neck and terminated on the aorta and brachiocephalic artery. The caudal cervical ganglion could not be found on the left side.

Several large branches left the stellate ganglion, passed down over the aorta and pulmonary artery, crossed the left atrium behind the auricle, then followed the coronary vessels in their distribution to the heart. The thoracic part of the sympathetic system appeared normal.

Abnormalities in Related Structures

The cervical portion of the oesophagus and trachea had its normal position in the anterior third of the neck. Caudad to this, the oesophagus was related to the left dorsal surface of the trachea as far back as the thoracic inlet. Here it

became more dorsal and passed above the bifurcation of the trachea. In the lower two-thirds of the neck both the oesophagus and trachea were displaced to the extreme right by the heart.

There were two large evaginations of the pleura in front of the thoracic inlet. The right evagination took the form of a large collapsed sac 20 cm. long, extending forward between the pericardium and cervical muscles. The left sac had the same diameter but only half the length. It is doubtful if the lungs entered these sacs during life.

The apical lobe of the right lung consisted of four parts of almost equal size and several smaller segments. The apical bronchus branched to all these parts. This lobe practically filled the opening between the first ribs ventral to the aorta, oesophagus and trachea. The cardiac lobe of the right lung was smaller and more oval in shape than the normal.

The anterior lobe of the left lung was divided into two nearly equal parts by a longitudinal fissure. The bronchus to this lobe branched from the trachea one cm. in front of the left bronchus. No decision was made as to whether this was all apical lobe or fused apical and cardiac lobes. If it was the former then the cardiac lobe was absent. The right and left diaphragmatic and right intermediate lobes were normal.

SUMMARY

The heart and related structures as found in a case of ectopia cordis is described.

The heart was found in the lower cervical region with the base anterior to the thoracic inlet and the apex under the third cervical vertebra. The organ was approximately normal in size but flattened dorso-ventrally. The compartments were normal in number but abnormal in shape and relationship. The precava was split into right and left divisions somewhat as found in the rabbit or rat. The systemic veins were all present. The brachiocephalic artery terminated in the right and left common carotid and right brachial arteries. The left brachial was a branch of the aorta. The cervical sympathetic and vagi nerves had some abnormal branches and relationships. The oesophagus and trachea were displaced to the extreme right in the region of the heart. The pleural sacs extended forward between the pericardium and cervical muscles. The apical lobe of the right lung was in several parts. The anterior lobe of the left lung was either fused apical and cardiac lobes or a divided apical lobe. If the latter was the case, then the cardiac lobe was absent.

NOTE:—A fairly complete motion picture film, in colour, showing views of this animal from the time of admission until completion of dissection, has been made by Dr. C. A. V. Barker of the Clinical Department, Ontario Veterinary College.

ACKNOWLEDGMENT

The author wishes to express his grateful appreciation to Miss Beverley Lynde for her splendid work in preparing the drawings and retouching the photographs used in this report.

REFERENCE

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A PEROCORMUS AND ATRETOCORMUS FILLY

V. R. Brown, V.S., D.V.M.

The filly to be described was brought to the College for surgical treatment because of the absence of an anus. Examination revealed the absence of a tail and natural openings through which urine and faecal material could be voided. Surgical treatment was considered to be impossible and the animal was turned over to the Department of Anatomy for study. It was subsequently killed and prepared for dissection in the usual manner. Through an oversight. pictures were not taken until after euthanasia.

It is with pleasure that I record my grateful appreciation of the work of Miss Beverley Lynde. Miss Lynde made the drawings and did some of the retouching of the photographs. In the preparation of the illustrations, photographs were first made and the resulting prints retouched in order to bring out the important details. Little liberty, if any, was taken with the anatomical features.

REPORT OF THE ANATOMICAL ABERRATION

External Features

The weight after death was 112 pounds. The over-all length of the animal from the tip of the nose to the ischial tuberosity was 140 cm. The height at the withers was 90 cm. In all parts except for the lack of a tail and the natural openings the filly was normal.

Fig. 1. Lateral view of filly showing absence of tail and natural openings.

Fig. 2. Posterior view of filly before dissection.

Figures 1 and 2 show the appearance before dissection was started. Where the tail should have been there was a marked depression. Palpation did not reveal spinous processes for the sacral vertebrae, nor evidence of coccygeal bones. An opening was located 7.3 cm. below the ischial arch. This is shown in Figures 2

Fig. 3. View showing topography of structures located between the thighs.

Fig. 4. Lumbar and sacral segments of the vertebral column showing size and development of sacrum.

and 3. The orifice was slit-like and situated on a rounded prominence. Upon passing a probe into the cavity it was found to end in a cul-de-sac 2.6 cm. deep.

The external appearance of the mammary gland in so far as position and attachments were concerned was apparently normal. The teats (see Fig. 3) were 2.0 cm. in length and flattened side to side. Both nipples had two orifices. The umbilical stump was 6.0 cm. long and had already become quite dry.

The Gross Anatomy

After careful consideration of all factors involved, it was decided to describe the structures systematically rather than regionally so that a better understanding of the deviations would be gained by the reader. Dissection was carried out as is usually done in courses of comparative anatomy.

Osteology

The vertebral column was normal as far as the sacrum where only three vertebrae were undergoing ossification. The fourth was a rudimentary cartilaginous structure without ossification centres and there was no evidence of a fifth bone. No coccygeal bones or rudiments thereof were found. A strong fibrous cord extended downward and backward from the posterior segment of the sacrum to attach upon the tuber ischii of each side. This gave attachment to the muscles which normally attached to the sacral and coccygeal vertebrae. The pelvis did not present any change from the normal.

Muscles and Ligaments of the Gluteal Region

The skin over the gluteal region was reflected without difficulty. The fascia over the area was normal except for near the dorsal mid-line. Here it was much strengthened and attached in front to the rudimentary spinous processes of the sacrum as shown in Figures 5 and 6.

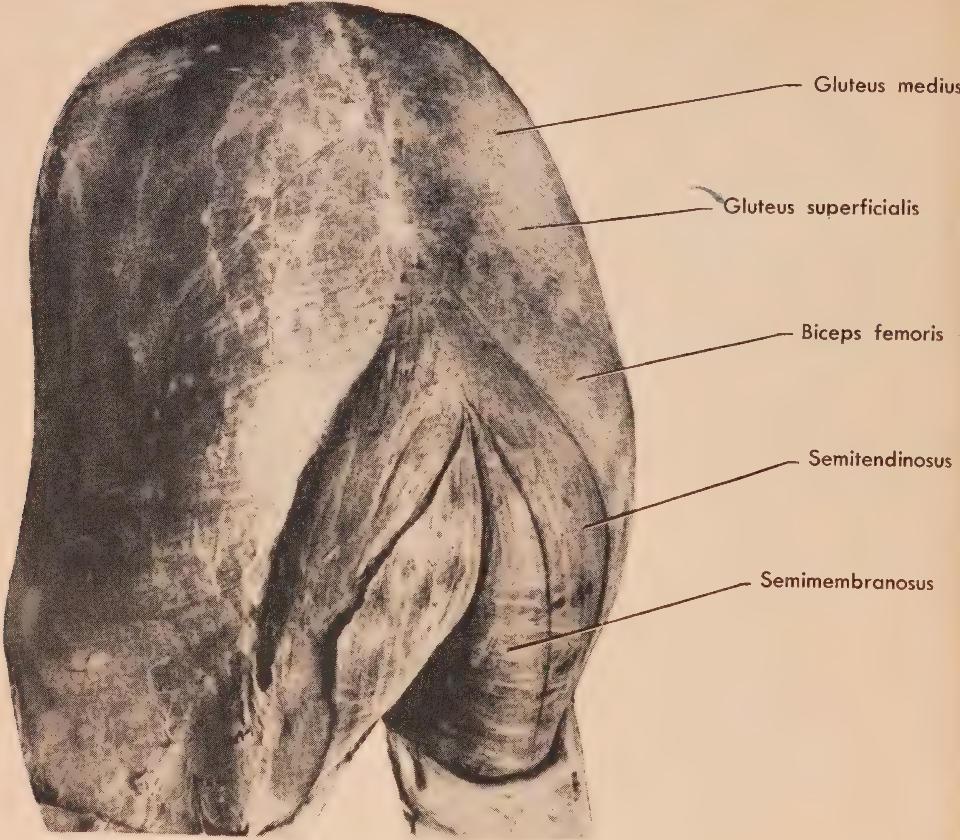

Fig. 5. Superficial musculature of gluteal region and thigh. Note the absence of coccygeal rudiments.

The only deviations from the normal muscle arrangements concerned the biceps femoris, semitendinosus and the semimembranosus. The portions usually attaching directly or through fascia to the sacrum and coccygeal vertebrae came from a strong fibrous band connecting the sacrum with the tuber ischii. A marked depression existed in the mid-line of the coccygeal region.

The sacro-sciatic ligament was attached above to the borders of the sacrum and to the fibrous band continuing it. Ventrally the ligament was attached anteriorly to the ilium and posteriorly to the ischium in the normal manner. The sciatic foramina were normal.

The coccygeus muscle had a fleshy origin on the medial surface of the sacro-sciatic ligament as far forward as the sacrum. The fleshy part was continued backward as a tendon which became progressively narrower and fused with the fibrous tissue on the tuber ischii.

The retractor ani muscle was represented by a thin fleshy strip extending between the sacro-sciatic ligament and the cloaca.

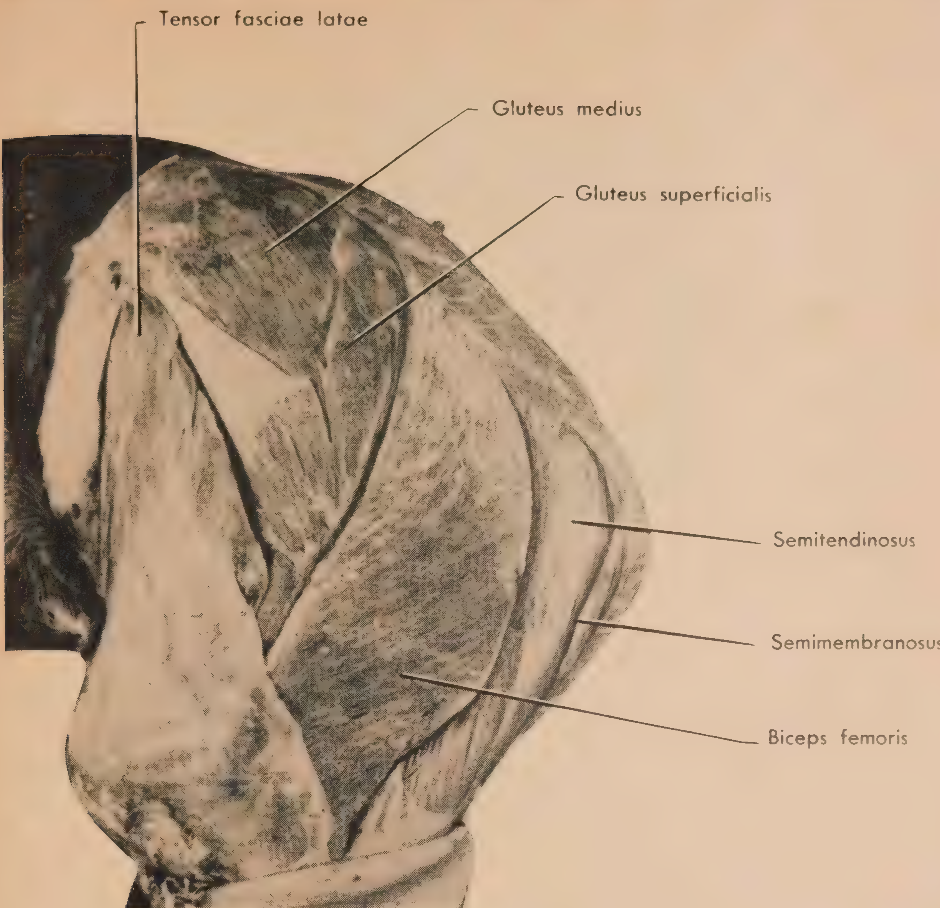

Fig. 6. LATERAL VIEW SHOWING SUPERFICIAL MUSCULATURE OF GLUTEAL AND THIGH REGIONS.

The Abdominal Portion of the Digestive Tract

There was no morphological deviation in the digestive tube until the terminal colon and rectum were reached. Some portions were displaced in position. A brief description of the various parts will be included as a point of general interest.

THE STOMACH: The shape, position and attachments were normal. The greatest length was 8.3 cm., and the greatest diameter was 6.4 cm. The capacity as determined by filling with water until the walls were tense was 125 cc. When opened along the greater curvature a ball of straw and hair 5.0 c.m. in diameter was found. The mucous membrane of the pyloric region was in relatively wide folds much like those in the abomasum of the ox. These were longitudinal and directed toward the pylorus.

THE SMALL INTESTINE: The duodenum presented nothing out of the ordinary. The jejunum was in numerous coils arranged on the right side and related mostly to the caecum and colon. The ileum was directed backward to enter the medial side of the lesser curvature of the base of the caecum. The lymph glands

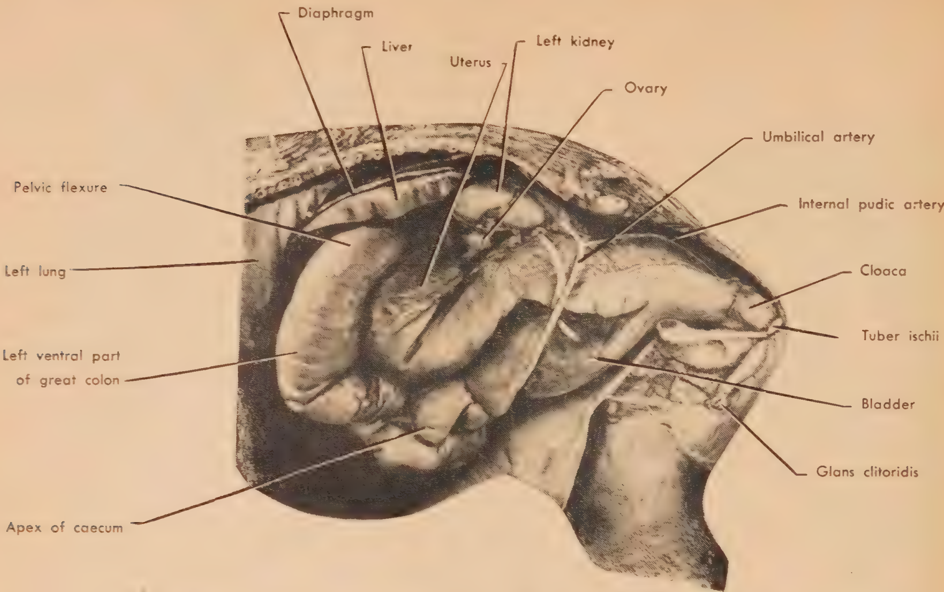

Fig. 7. SAGITTAL SECTION OF THE ABDOMINAL AND PELVIC CAVITIES TO SHOW THE TOPOGRAPHIC ANATOMY OF THE VISCERA.

at the root of the great mesentery were numerous and many were two or more centimetres in diameter.

THE LARGE INTESTINE: The caecum was found normal except for position. The base was fixed in its usual location. The apex was directed to the left so that the body crossed the mid-line in a plane through the umbilicus.

The large colon was normal in structure, shape and size. In position the pelvic flexure was forced anteriorly by the distended uterus and bladder so that the left parts of the great colon became related to the visceral surface of the spleen. The pelvic flexure was placed below and in front of the left kidney. The total length, measured along its free border, was 132 cm. The diameter of the various parts was as follows:

RIGHT VENTRAL	STERNAL FLEXURE	LEFT VENTRAL	PELVIC FLEXURE	LEFT DORSAL	RIGHT DORSAL (GREATEST)
7.0 cm.	5.6 cm.	6.4 cm.	4.1 cm.	3.1 cm.	6.3 cm.

THE SMALL COLON AND RECTUM: The small colon began in a plane below the left kidney. The total length measured 30.0 cm. It was attached by a narrow mesocolon to the sublumbar region. The small colon continued backward almost in the mid-line, to enter the pelvic cavity as the rectum. The latter first formed one complete coil, then continued straight backward a distance of 5.0 cm. to terminate by joining the cloaca in its antero-dorsal part. The rectum was attached at first to the right horn of the uterus and behind its coiled portion to the cloaca. The opening of the rectum into the cloaca measured 2.7 cm. in width.

THE CLOACA: The cloaca is best understood by referring to Figure 8. It was cone-shaped with the base in front and the apex curved downward and

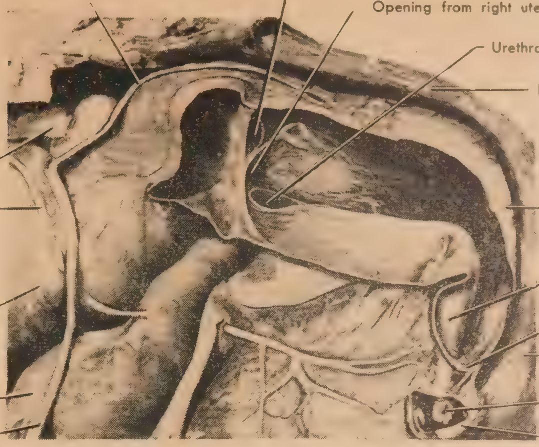

Fig. 8. SAGITTAL SECTION OF THE PELVIS TO SHOW THE TERMINATIONS OF THE UTERUS, RECTUM AND URETHRA INTO THE CLOACA.

forward around the ischial arch to end a short distance below. The diameter of the base was 6.3 cm. where it joined the orifices of the rectum, uterus and bladder. Two and one-half centimetres below the ischial arch the diameter had diminished to 2.2 cm. The length of the extra pelvic part was 5.7 cm. It terminated in a blunt point. The extra pelvic portion was related in front to the clitoris and behind it was covered with integument. There was no opening between the cloaca and the exterior. The walls were very thin, being little more than one millimetre in thickness. At the ischial arch the cloaca was very firmly adhered to the ischial bones. There was a small quantity of meconium and fluid in the lumen of the cloaca.

The Urinary System

THE KIDNEYS: There were no deviations in size, shape or structure observed.

THE URETERS: The ureters extended backward from the hilus of the corresponding kidney and then downward in the broad ligament. After crossing the cornua of the uterus they gained the lateral surface of the bladder and terminated in the normal manner.

THE BLADDER: The pear-shaped bladder was distended with about two litres of fluid. It occupied the major portion of the inguinal and prepubic regions and extended forward to a distance of 9 cm. in front of the umbilicus. The greatest width of the bladder was 19 cm. The umbilical arteries were firmly attached to the related parts of the bladder. The posterior portion or neck of the bladder measured 3.5 cm. in diameter. The urethra was in free communication with the cloaca through a rounded opening 3.7 cm. in width. The line of peritoneal reflection from the abdominal wall to the urogenital tract was at the margin of the pelvic entrance.

The Genital Tract

The ovaries were located ventro-lateral to the corresponding kidney, and were considerably larger than normally found. The left ovary measured 3.4 cm.

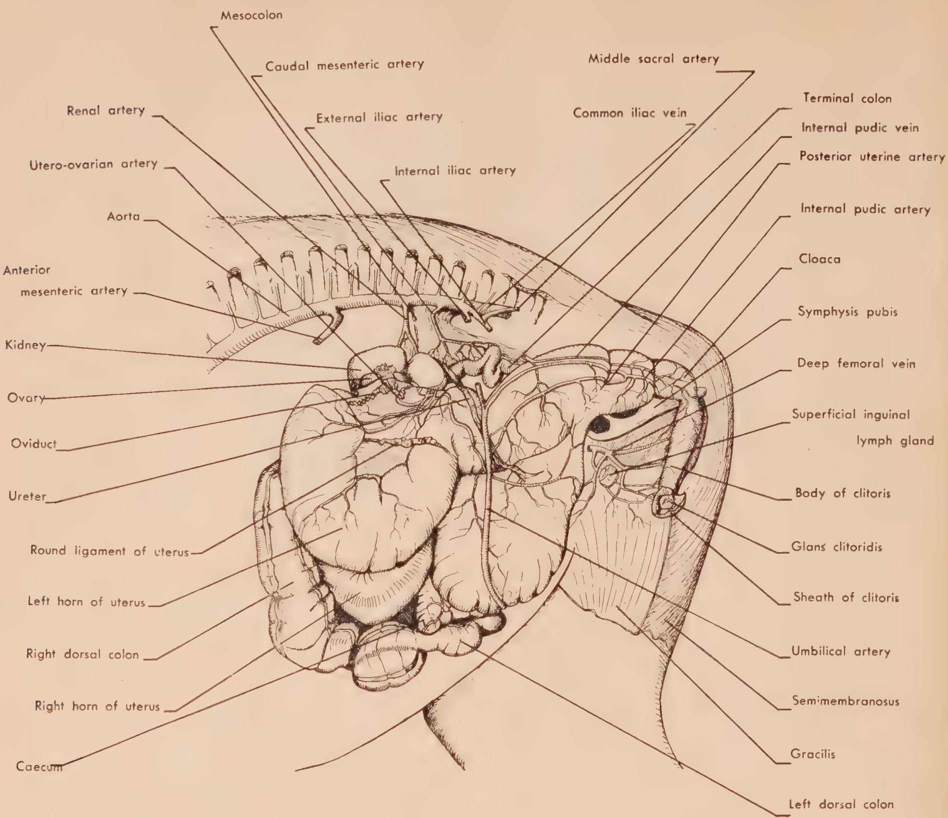

Fig. 9. Diagram showing the arterial distribution to the abdominal and pelvic viscera.

in length, 1.8 cm. in width and 2.1 cm. in thickness. The right ovary was 4.3 cm. long, 1.9 cm. wide, and 2.4 cm. thick. There were no visible follicles on the left ovary but seven were counted on the right.

The oviducts were the same as found in the adult female. The left entered the corresponding horn three centimetres from the extremity, and on the attached border. The right oviduct entered the horn at the extremity.

The uterus was extremely large. It occupied nearly all of the upper left flank region and had pushed other structures forward and to the right. The body was not present as normally found. The right horn had a length of 32 cm. measured along the greater curvature. The left horn was two centimetres shorter. The broad ligaments were attached close behind the corresponding kidneys and continued backward along the sublumbar region to the pelvic entrance, where they turned ventral to reach the uterus. The cornua were closely adherent in their posterior third. Externally, there was no apparent demarcation between the cloaca and the cornua. Each horn had a separate communication with the cloaca. Between the opening there was a thin membrane formed by the union of the cornual walls. The diameter of the cloacal opening of the right horn was 1.8 cm.

and for the left opening was 2.4 cm. The walls of each horn were very thin, being almost paper-like in their distended condition. A quantity of fluid and some gas were present in the uterus.

The vagina was not developed.

The body of the clitoris (see Fig. 8) measured 5.9 cm. in length and 1.1 cm. in width, near its middle. It was attached to the ischial arch by two fibrous crura. The free part or glans clitoridis was oval in circumference and flattened below. It was covered with a folded integument and darkly pigmented. The central depression on the extremity of the glans clitoridis had no communication with the apex of the cloaca. A well-developed suspensory ligament was found extending from the symphysis ischii to the body of the clitoris. Two well-developed muscle bundles were present on the posterior surface of the body. These were comparable to the retractor penis muscle of the male. They were 4.4 cm. long and 0.3 cm. wide near their mid-portions. The blood and nerve supply was comparable to that for the homologous organ of the male.

The prepuce of the clitoris formed the opening seen between the thighs in Fig. 2. It was 7.3 cm. below the ischial arch and the orifice was slit-like and 1.1 cm. long. The margins of the opening were rounded. The cavity within the prepuce measured 2.6 cm. deep. The lining membrane was darkly pigmented and formed numerous folds.

Angiology and Neurology

There were so few deviations from the normal arrangement of blood vessels and nerves that only those of interest will be mentioned.

The internal pudic artery (see Fig. 9) passed caudad between the cloaca and the sacro-sciatic ligament. It terminated near the ischial tuberosity by dividing into numerous branches. One of these continued downward to supply the clitoris. The posterior uterine artery was given off the internal pudic a short distance behind the middle of the pelvic cavity. After a course of one centimetre it divided into two branches. The smaller posterior division was distributed to the cloaca. The large anterior branch passed forward on the cloaca and was readily traced to the lateral surface of the uterus. Many small branches extended downward to the bladder and urethra.

A nerve trunk analogous to the pudic and haemorrhoidal nerves was found leaving the sciatic just above the origin of the posterior gluteal nerve. It followed the internal pudic artery in its ramifications.

SUMMARY

A new-born filly was presented to the Department of Anatomy for study. The tail had not developed and there were no external openings of the intestinal and urogenital tracts. Dissection revealed that the vertebral column had not developed posterior to the third sacral vertebra. The intestinal and urogenital tracts emptied behind in a well-formed cloaca. Each horn of the uterus had a separate communication with the cloaca. The uterus and the bladder were greatly enlarged. It would have been impossible to correct these aberrations by surgical procedure.

CERESAN* POISONING IN SWINE

F. W. Schofield, D.V.Sc.

During the last few years two reports of mercurial poisoning in swine have appeared in veterinary literature—that of Taylor[1] in 1947, and that of McEntee[2] in April of the present year. The cases described here occurred during the summer of 1947, so that we were not familiar with the symptoms described by these authors; otherwise a correct diagnosis might have been made at an earlier date. Clinical and post-mortem findings were identical with those recorded by the above-mentioned investigators. The history of the disease differs somewhat from that already reported and is of sufficient interest to warrant special mention. In passing, one might note that although 'ceresan' and other similar fungicides are widely used by the farming community, poisoning due to feeding the treated grain seems to be rare. The practice of feeding treated grain diluted with untreated is apparently not uncommon.

CASE REPORT

History

A dead shoat weighing about 100 pounds was brought to the Ontario Veterinary College. Post-mortem examination revealed extensive necrotic enteritis. The history given by the owner was unusual and indicated something other than enteric infection. Eight or ten pigs among 24 four-month-old pigs which had been thriving were affected with a strange disease. Some were highly nervous, others weak and stupid. Several had already died. Thinking that the animals might improve if turned outside, the owner had turned them into the barnyard. At this time, four of the nervous animals had run across the field in the direction of the bush, barking and grunting and acting in most distracted manner. These animals had never been seen since. (The owner was not a particularly active or intelligent man.)

Symptoms

When the premises were visited, the remaining pigs were found to be suffering from a profound toxaemia. Some were paralyzed, while others showed marked incoordination, staggering and falling over as though intoxicated. One animal might fall on the body of another where it would remain for some time (see Fig. 1). The head and forelegs of a pig might be in the feed trough, the animal having staggered to the trough desiring to eat, and then collapsing (see Fig. 2).

The skin of the affected animals was free from rash and no abnormal temperature was recorded. During the following week, all the sick pigs died.

Ceresan Poisoning

The owner was informed that some toxic agent was present in the feed. The latter was composed of oat and barley chop with swill from the house, some skim milk and water, all mixed in a large barrel. The unmixed chop appeared perfectly good; there was no evidence of mould or spoiling. The owner denied the possibility of any poisonous substance entering the feed. Instructions were given that the barrel was to be thoroughly cleaned, the swill eliminated, and chop from another grind used as feed.

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* Ceresan — a proprietary preparation containing five per cent ethyl mercury phosphate and lead derivatives.

Fig. 1. PIGS SHOWING EFFECTS OF FEEDING ON CERESAN-TREATED GRAIN.

Fig. 2. PIG SHOWING EFFECTS OF FEEDING ON CERESAN-TREATED GRAIN.

A day after the death of all the pigs, the owner asked, "Would ceresan-treated grain do any harm?" He had a number of bushels of treated grain which he had mixed with untreated and fed to the animals. Although the ceresan container was clearly marked POISON and the familiar skull and cross bones pictured on the label, the owner thought that dilution with good grain would result in a reasonable margin of safety. Moreover, he had fed treated grain before, with no fatal results.

Post-mortem Findings

No lesions were found in two pigs which were examined.

Histo-pathological Findings

Sections of the brain stem and cerebrum showed degeneration and necrosis of the neurons.

Feeding Experiment

Since the writer was unfamiliar with the symptoms of ceresan poisoning in swine a simple feeding experiment was undertaken.

Two pigs weighing 90 pounds each were fed grain which had been dusted with ceresan (one-half ounce to three bushels of grain—this strength represents approximately one-third of the amount recommended for treatment of grain).

After 16 days of eating this preparation, one of the pigs exhibited symptoms of anorexia, and a few days later the other animal appeared to be affected in the same manner. When made to move in the open, it was noticed that both animals raised the hind legs in an exaggerated manner, resembling a horse with stringhalt. There was also a definite tendency to walk into any obstruction, indicating blindness or impaired vision. Within a few days, both animals were partially paralyzed and could stand only when supported. Anorexia was complete, and the pigs remained recumbent and in a profound stupor. On the twenty-third day both were killed and a post-mortem examination made. No gross lesions were present. The clinical picture produced in this experiment was identical with the symptoms manifested by the pigs in the mysterious poisoning described.

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CYANIDE POISONING IN CATTLE

F. W. Schofield, D.V.Sc. and D.L.T. Smith, D.V.M.

Poisoning in cattle following the ingestion of cyanogenic plants is not uncommon, especially in those areas where such plants are indigenous, while accidental poisoning by chemicals containing cyanide is rare. The interest in the cases reported here centres in the unusual circumstances which surrounded the event.

CASE REPORT

History

A heifer, a member of a herd of 40 cattle, was found by the owner in a moribund condition, lying in shallow water at the edge of the river which flowed through the pasture. Little thought was given to this casualty. Three days later,

the owner discovered in the same pasture one dead cow and two acutely ill. The appearance of the dead cow indicated recent death. The other two animals were in great pain, struggled constantly, breathed with difficulty, and died within a few minutes.

Autopsy

A post-mortem examination of the carcasses was made but nothing of significance was noted. The contents of the rumen and reticulum were carefully screened for the presence of leaves or stems of plants which might be injurious, but none were present. Pieces of liver and kidney and some of the ingesta were taken for chemical analysis. The suddenness of these deaths and negative findings at autopsy, especially in the absence of any sickness in the remainder of the herd, strongly suggested poisoning. With this assumption we commenced an examination of the entire grazing area.

Survey of the Pasture

Early in June, a number of Holstein cattle had been turned into a large rough pasture of approximately 30 acres for summer grazing. A shallow river flowed tortuously through the centre, and the flats contained numerous depressions holding water in the spring or following a heavy rain. The land was uneven and covered with numerous thickets of densely growing shrubs. Naturally on such a terrain weeds of many varieties flourished. This fact added to the difficulty of determining the cause of death. On the south side of the river, at a distance of about 300 yards, there was a very abrupt rise of land. A gully in this bank had for some years been used as a dump and contained many old tins, cans and general rubbish. Footprints showed that one or two cattle had climbed the steep bank and reached the dump. However, examination failed to reveal any substance which might contain lead or other metallic poisons. A careful search along the borders of the river and in the swampy places was made but none of the known poisonous plants were found.

The carcasses of the last two cows that died were lying within a few yards of a large wooden tank which had apparently been carried downstream in the spring flood and become lodged on a small ridge of land which projected a few feet above the surrounding land. The tank contained about 16 inches of water some of which had accumulated during recent heavy rainfall. On the edge were two heavy copper terminals and the tank had been lined with pitch. Its appearance strongly suggested a primitive type of electro-plating tank. Enquiry revealed the fact that about seven miles upstream there was a factory where electro-plating was occasionally done. A quantity of the water was placed in a clean jar for subsequent tests. The tank and its contents were then removed from the pasture.

Biological Tests

A nondescript calf, one month old, was drenched with 3,000 cc. of water taken from the tank. Almost immediately the calf staggered, trembled, and fell. The breathing was laboured, the pulse rapid (70) and the eyes showed nystagmus. The breathing became oral, with ever-increasing intervals between the inspiratory act. The legs moved rapidly in a paddling motion just prior to death. Forty minutes elapsed between the first symptoms and death. A peculiar bleeding occurred soon after the animal fell to the ground. Autopsy of this animal revealed no

significant lesions, but venous blood quickly took on a bright cherry red colour when exposed to the air.

The symptoms exhibited by this animal and the post-mortem findings suggested cyanide poisoning.

Chemical Analysis

No cyanide was detected in materials removed from the dead cattle. The water from the tank, however, was strongly positive for cyanide.

Addendum

Further enquiry substantiated the suspicion that the tank had been used for electro-plating and that cyanide was an essential reagent in the method used.

No additional deaths occurred among the 36 animals which remained in the pasture.

PULMONARY HYPERTROPHIC OSTEO-ARTHROPATHY (MARIE'S DISEASE)

W. J. Rumney, D.V.M. and F. W. Schofield, D.V.Sc.

INTRODUCTION

Pulmonary hypertrophic osteo-arthropathy (Marie's disease), which affects both man and the lower animals, has only occasionally been recognized and reported in veterinary literature. The characteristics of the disease are: (1) subperiosteal formations of cancellated bone, affecting chiefly the extremities; (2) a peculiar symmetry of the bony lesions of the limbs; and (3) the co-existence of some chronic pulmonary disease such as tuberculosis or neoplasia.

The pathogenesis of this disease, as pointed out by Cotchin[1], is still undetermined. The usual view attributes the lesions to faulty nutrition, the result of chronic pulmonary disease. It is questionable whether in this case the comparatively small size of the tumour could have caused significant interference with respiratory or cardiac function. A bibliography of the disease as it occurs in the horse is given in an excellent paper contributed by Cotchin[1].

We believe that the only other case of Marie's disease in animals reported as related to pulmonary neoplasia, is that described by Poley and Taylor[2], where the tumour was believed to be benign. In the case observed by us and reported here, the tumour was malignant.

CASE HISTORY

History and Symptoms

The patient (see Fig. 1), a Springer spaniel, male, 11 years of age, had shown symptoms of pulmonary disease with a slight cough and dyspnoea over a period of about two years. The owner had noticed thickening of the legs during the last two months. When presented at the clinic on February 11, 1950, the thickening extended from the terminal phalanges to the shaft of the long bones in all four legs. The legs appeared to be almost twice their normal thickness. The dog moved with a stiff gait but evinced little pain when the legs were manipulated. The animal was in fair condition and the appetite was good.

Fig. 1. NOTE THE MARKED THICKENING OF THE LIMBS.

The result of urinalysis was negative. Examination of the blood revealed the following:

Erythrocyte count		6,280,000
Leukocyte count		18,000
Differential count—Neutrophils	57%	
Stab cells	22%	
Lymphocytes	6%	
Monocytes	13%	
Eosinophils	2%	

Radiology

X-ray showed the presence of a growth in the mediastinum. This did not cause either abnormal heart sounds or abnormal chest sounds. The extensive formation of new bone covering the surface of the radius and metacarpal bones is well illustrated in Fig. 2. The articulations appeared to be unaffected. Euthanasia was given on March 2, 1950.

Gross Pathology

Both fore and hind limbs presented a characteristic appearance due to the progressive enlargement which extended from the knee and hock joints to the terminal phalanges. Removal of the skin revealed that this change was due to a

Fig. 2. SHOWING LAYER OF BONY TISSUE ON THE SURFACE OF THE RADIUS AND ULNA.

marked increase in both the subcutaneous connective tissue and the underlying bone. Slight pathological changes were detected at the distal extremities of both the humerus and femur, but this was much more pronounced in the distal extremities of the limbs. The remainder of the skeleton appeared normal.

THE BONES: The true nature of the changes which occurred in the bone became apparent only after the soft tissues were dissolved by boiling water or removed in some other way. The affected bones were either partially or completely covered with an uneven and irregular deposit of osteoid tissue. This was either in the form of a smooth diffuse deposit overlying the shaft of the bone, or, especially in the older lesions, had a characteristic verrucous appearance, closely resembling the lesions seen in the bark of the plum tree affected with 'black-knot'. These innumerable osteophytes growing at right-angles to the surface of the bone were somewhat clubshaped or mushroomed due to the swollen free extremity of the bony projections (see Fig. 3).

The increase in the circumference of the affected bone showed great variation—from 0.5 to 3.5 cm. Although the osteophytes encroached slightly upon the articular surface in the terminal phalanges, in no case did they interfere with the movement of the joint.

The vascularity of the lesion was indicated by the large number of foramina which penetrated the bony tissue. Posteriorly, where the tendons move in close proximity to the bone, the deposit of bony tissue was usually slight, smooth, and devoid of osteophytes.

Fig. 3. Showing innumerable osteophytes growing on the surface of the bone.

The lesions were most marked in the distal bones of the limbs and were either very slight or absent on the surface of the scapula and proximal extremity of the femur.

The Liver: The liver was dark in colour, with increased friability.

The Spleen: Normal, except for the presence of a small nodule 1.5 cm. in diameter and pinkish-grey in colour.

The Kidneys: Normal.

The Lymph Nodes: Normal.

The Lungs: The intermediate lobe was almost completely replaced by a spherical, tumour-like mass 6.0 cm. in diameter, which was contained within the pleura of the lobe (see Fig. 4). The unaffected portions of the lobe were collapsed. On section, the mass was greyish-pink in colour and very friable. The remaining lobes were normal, or showed slight hypostatic congestion.

All other organs and tissues were normal.

Histo-pathology

The Bones: The histology of the bony tissue varied to some extent depending upon the degree of development and the location of the lesion. There was a marked lack of uniformity in structure. Active proliferation of the cells in the deeper layer of the periosteum, the osteogenic layer, was observed in all sections. The newly formed osseous tissue varied from a well-developed cancel-

Fig. 4. Showing tumour of the intermediate lobe of the lung.

lated bone in some areas to an undifferentiated mass of osteoid tissue. The osteoid tissue was characterized by irregular trabeculae surrounding large or small medullary spaces which contained a loose fibrous tissue and a few small blood vessels. In some areas there were nodules composed almost entirely of cartilage. The newly formed bony tissue developed between the osteogenic layer of the periosteum and the cortical layer of the bone. The underlying compact bone showed evidence of rarefaction (see Fig. 5).

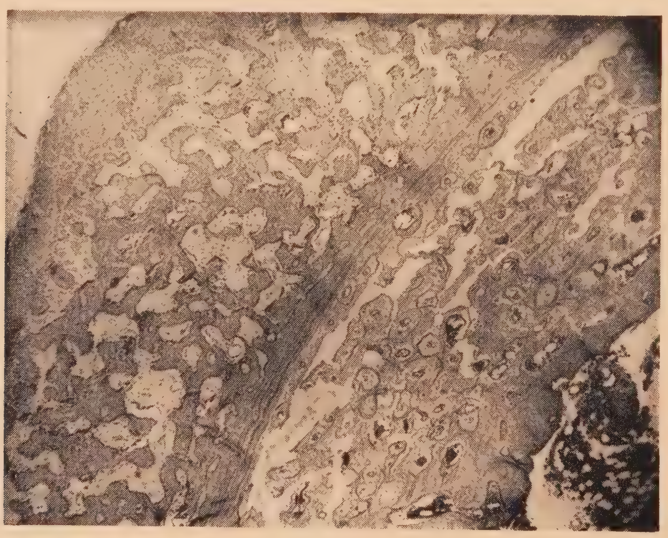

Fig. 5. Showing periosteum, newly formed bone, and compact bone of the shaft with rarefaction.

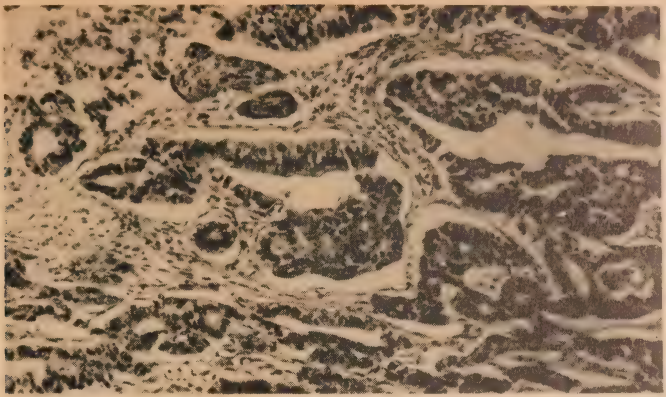

Fig. 6. Showing characteristic arrangement of the epithelial cells of the tumour.

The Pulmonary Tumour: The tumour was composed of columnar type epithelial cells which occurred in masses (see Fig. 6), duct-like structures, and alveoli, with a definite tendency to the formation of glandular tissue. Mitotic figures were frequently seen. The growth was diagnosed as a bronchogenic carcinoma (adeno-carcinoma type).

The Liver: There was an increase in the connective tissue surrounding the central vein with slight dilation of the surrounding sinusoids, suggesting early passive congestion.

The Kidney: This organ was normal, except for the presence of rectangular inclusion-like bodies in some of the epithelial cells of the convoluted tubules.

The Spleen: The parenchyma was normal and the small tumour was composed of lymphoid cells.

DISCUSSION

The disease described is undoubtedly hypertrophic pulmonary osteo-arthropathy or Marie's disease. The malignant tumour in the lung had no direct relationship to the lesions of the bones. In the latter there was no evidence of malignancy. It is questionable whether a tumour only 6.0 cm. in diameter could have interfered sufficiently with the respiratory and circulatory processes to have resulted in such extensive lesions in the bony extremities. It is of interest to note that the blood picture in our case corresponds closely with that reported by Cordy and Dinsmore[3] in that neutrophilia and slight monocytosis were present.

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AN ENORMOUS OVARIAN TERATOMA

R. A. McIntosh, M.D.V., B.V.Sc.

History

On August 11, 1949, a crossbred Hereford heifer was submitted to the Ontario Veterinary College clinic for examination and diagnosis. The heifer was about 15 months old and had developed more or less normally as a calf. In the latter part of the winter of 1949 it was observed that she appeared to be somewhat "pot-bellied" and was not growing as she should. In the spring, both of these features of the case became much more noticeable.

Clinical Examination

When the animal was presented at the clinic, the abdomen was greatly distended laterally (see Fig. 1). Respiration was rapid but not laboured. The temperature and pulse rate were normal. The animal ate, drank, and ruminated. Deep palpation of the abdomen revealed the presence of a firm body on either side.

Fig. 1. Heifer with ovarian teratoma. Note the extreme lateral distension of the abdomen.

Fig. 2. THE TUMOUR.

Treatment

The heifer was kept under observation for about a week and then it was decided to perform an exploratory laparotomy. Under local anaesthesia, an abdominal incision was made on the right side. This enabled the operator to introduce the hand and arm and made palpation of the tumour possible. In this examination it was learned that portions of the small intestines were adherent to the superficial layers of the tumour and that removal of the new growth would not be possible without endangering the life of the patient. The animal was then given a euthanistic dose of chloral hydrate and a post-mortem examination was made.

Post-mortem Findings

The autopsy revealed that the tumour had its origin in the ovary. The surface of the growth was of a whitish yellow colour not entirely smooth on its surface, and there were places where the tissue was of a darker hue with large nodular elevations. In the areas where the intestines were adherent they were quite firmly attached. After removing the tumour from the carcass it was found that the growth weighed 96 pounds (see Fig. 2).

Pathological Features of the Tumour

Specimens of tissue from the tumour were taken from different parts of the growth for section and microscopic examination. Following is the report of the Department of Pathology regarding the character of tissue cells observed in the section:

Section No. 1: Epidermis with an abundance of melanin overlies subcutaneous connective tissue containing glands (sweat), cartilage, hair follicles, salivary glands (mucous and serous), nerve trunks, fat smooth muscle, lung tissue with alveoli the walls of which contain melanin pigment and a papillary cystadenoma.

Section No. 2: Composed of fat and connective tissue supporting epithelial pearls. These pearls vary from solid masses of cells with clear cytoplasm of keratinized epithelium to cyst-like structures.

Section No. 3: Composed of striated muscle, fat into which calcium has infiltrated, and connective tissue into which malignant type epithelial cells are infiltrating and attempting to form glands.

Diagnosis

Teratoma of ovary.

TESTICULAR BIOPSY TECHNIQUES IN BULLS*

C. A. V. Barker, D.V.M., M.Sc., D.V.Sc.

The increasing interest in the study of infertility in bulls has resulted in numerous reports on semen abnormalities, spermatic cytology and other features related to the physiology of spermatozoa. In general the microscopic study of testicular tissue has been neglected, and only a few reports are available on testicular pathology.

A study of spermatic cytology in infertile bulls usually will provide evidence of deranged spermatogenesis, but the changes in the testicular tissue cannot be predicted with accuracy. For example an advanced degeneration of the seminiferous tubules may have the same semen characteristics as chronic orchitis. In order to determine the actual state of testicular function it is necessary to adopt a procedure such as testicular biopsy which permits direct microscopic examination of the epithelial cells lining the seminiferous tubules. As its name implies, testicular biopsy consists of the surgical removal of a piece of testicular tissue, theoretically so small as to have no adverse effect on the gland, yet large enough to include a representative number of tubules.

In human medicine the operative technique has been described by Charny[1]. In veterinary medicine a procedure has been described by Erb *et al*[2] and Sykes *et al*[3]. In the College clinic selected cases of infertile bulls have been biopsied by a technique similar to that used by Erb and Sykes. In addition, another technique has been developed using a biopsy needle originally devised for liver biopsy in humans. These techniques are described in detail as follows:

Technique 1. Exposure of the Testicle

The operation is performed in the standing position under suitable restraint, the posterior surface of the scrotum being the site. The tail, demobilized by a light epidural anaesthesia, is tied to one side. Both spermatic cords are infiltrated well above the testicles with 2.5 per cent procaine hydrochloride solution. After application of an antiseptic, a portion of the skin on the posterior surface of the scrotum is infiltrated with 2.5 per cent procaine hydrochloride. The testicle is drawn snugly down into the scrotum with the operator's left hand, the spermatic cord

* Presented at the Convention and Meeting of the Ontario Veterinary Association, July 17, 1950.

being grasped firmly. An incision about one to one and one-half inches long is made through the skin and fascial tissues until the parietal layer of the tunica vaginalis is opened. The surface of the testicle then appears as a glistening white tissue (visceral tunica vaginalis and tunica albuginea). A small nick is made in the surface of the testicle and the free edge is grasped with mosquito forceps. While an assistant holds the testicle in position, a small piece of testicular tissue is excised with a scalpel or curved iridectomy scissors. Haemorrhage is controlled by the assistant's steady pressure on the spermatic cord. The testicular incision is not sutured. The parietal tunica vaginalis is sutured with continuous catgut sutures. The skin and fascial tissue is closed with three or four interrupted catgut sutures and the wound swabbed with Tr. Benzoin Co. The skin sutures are removed in six days. The small, irregularly-shaped specimen of tissue is immediately placed in Bouin's or Zenker's solution for fixation.

Technique 2. Vim Silverman Biopsy Needle*

The Vim Silverman needle was designed for human liver biopsy to yield the maximum tissue specimen with minumum trauma. The instrument consists of two parts: an outer needle or cannula of 14 G. and an inner needle of 17 G., the inner needle being split longitudinally from point to hub and being approximately one-half inch longer than the outer needle. Position, anaesthesia and antisepsis are the same as in Technique 1. The testicle is pulled and held snugly in the bottom of the scrotum by an assistant. The outer needle with trocar is inserted through the skin and into the testicular tissue far enough to fix it in position. The trocar is removed and the inner split needle inserted and advanced until tissue is encountered. The outer needle is held firmly while the inner needle is advanced its whole length so that the points enter the tissue. A sense of resistance is felt when the split needle enters the testicle. The inner needle is now held stationary while the outer needle is advanced half an inch, thus compressing the two halves of the inner needle and getting a firm grip on the specimen between the prongs. The outer needle is then rotated once around the inner needle to sever the base of the specimen. Both needles are simultaneously withdrawn. The inner needle is removed, the two halves separated, and the small specimen is placed in a fixing solution. The scrotal skin puncture may be swabbed with antiseptic.

* Obtainable from the MacGregor Instrument Company, Needham 92, Massachusetts, U.S.A.

COMMENT

Experience with these techniques has shown that Technique 1 results in an adhesion between the parietal tunica vaginalis and the testicle. Sykes *et al*[3] have observed the same at post-mortem. This adhesion undoubtedly interferes with scrotal and testicular function and is, therefore, a deterrent in considering the operation as a means of studying testicular function in bulls with a slightly deranged spermatogenesis. This technique has been used on a normal bull with the same adverse effect on spermatogenesis as reported by Sykes *et al*[3]. Chiefly for this reason, Technique 2 was undertaken. Technique 2 has not been observed to cause testicular adhesion. Up to the present time, a normal bull has not been available for studies on the effect of the operation on spermatic development. Technique 2 is more easily performed than 1; however, there is a drawback in the size of the specimen obtained. Excellent specimens are obtained with Technique 2 if chronic orchitis is present, that is, if there is a considerable amount of fibrous tissue present. Occasionally testicles affected with tubular degeneration

are somewhat soft in consistency and suitable specimens may be obtained only by holding the testicle tightly in the scrotum during Technique 2. Because of its adverse effect on spermatogenesis, the exposure technique should not be used as a routine diagnostic procedure. On the other hand, the biopsy needle may prove useful if our limited observations are confirmed by further work. Whenever the physical and microscopic findings on a semen specimen suggest an unfavourable prognosis, testicular biopsy may prove useful in explaining the pathological cause of the abnormality.

SUMMARY

Two testicular biopsy techniques for bulls are described. The testicular exposure technique results in testicular adhesion and deranged spermatogenesis. Adhesion has not been observed with the biopsy needle. The biopsy needle method is believed to be a better means of biopsy than the exposure operation.

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PARAGONIMUS INFECTION IN A RANCH-RAISED FOX

A. H. Kennedy, B.S.A., V.S., D.V.M., D.V.Sc.

The Paragonimus genus of trematode parasites has almost a world-wide distribution. According to Stitt, Clough and Clough[1], trematodes of the *Paragonimus westermanii* species (Kerbert 1878 and Pringeri P. Compactus 1880) occur in pigs, dogs, cats, rats, various species of wild carnivora such as tigers, wildcats, panthers, foxes, wolves, and beavers. *Paragonimus kellicotti* has been found in North America in the pig, dog, cat, and goat, and is claimed to be a rather common parasite of the mink in some parts of the United States and Canada.

The infection results from the consumption of infected crabs or crawfish which serve as the second intermediate host in endemic regions. The first intermediate host is a snail.

In the various parts of the United States and Canada, considerable study has been made of the distribution of snails which may serve as an intermediate host to Paragonimus trematodes. La Rue and Ameel[2] state that the species *Pomatiopsis lapidaria* is found in Ontario at Brantford, Hamilton, and Kingsville. These authors also state that according to Chandler (1940), in the United States *Pomatiopsis lapidaria* serves as the molluscar host of *P. kellicotti,* while probably all species of Carrbanis serve as the crustacean host (Ameel 1934).

Kingscote[3] reported the presence of a Paragonimus trematode in the lungs of an adult fox raised on a ranch in the vicinity of Guelph, Ontario. He stated[4] that it was later determined that the caretaker on the ranch had used crawfish procured from a small stream in the vicinity as bait for fishing. He threw the crawfish that were left over into the fox pens as food, and they may have served as the final intermediate host for the trematode found in the fox.

(Original)

Fig. 1. KIDNEYS FROM FOX AFFECTED WITH PARAGONIMUS TREMATODES.

REPORT OF A CASE

History and Symptoms

The carcass of an adult platinum and white mutation fox was sent to the Ontario Veterinary College for post-mortem examination. The owner, living in southwestern Ontario, wrote that he had 16 foxes on his ranch. Three had died within a two-day period. A fourth was showing symptoms similar to those exhibited by the others prior to death.

According to the owner, the appetite of the affected fox was greatly reduced for two weeks before death, and the animal became thin and weak. A short time before death, the animal lay on its side kicking with its paws and breathing heavily.

Post-mortem Examination

The fur of the animal was dry and rough and the body was emaciated. The walls and mucosa of the stomach and intestines were normal in appearance, with no inflammation. No ingesta was found in the intestinal tract or stomach. The liver was dark reddish-brown, slightly enlarged, and somewhat congested. The gallbladder was filled with a thick, dark green gall.

The kidneys were reddish-brown in colour, soft, and somewhat swollen (see Fig. 1). The pelvis of the organs seemed abnormally large. The medulla nephrica was smooth and glassy. The medullary pyramids were prominent and well-defined. The cortex renis was brown and showed cloudy swelling. The bladder appeared normal.

The lymph glands were slightly swollen. The lungs were oedematous. Embedded in the tissue were six, large rounded tumour-like areas, dark blue in colour (see Fig. 2). When incised, these areas were found to be thick, capsule-like masses, each containing two trematodes in a small amount of debris and fluid.

(Original)

Fig. 2. Lungs from fox showing thick, capsule-like masses, each containing two large paragonimus trematodes.

Pathology

Much blood pigment was found in the liver. There was an increase in fibrous tissue in the spleen and also much blood pigment. Haemorrhage was observed in the myocardium and in the alveoli of the lungs, where much blood pigment was also present. A cavity was found in the lung tissue, and the wall of the lungs were composed of granulation tissue heavily infiltrated with macrophages and eosinophils. Numerous parasitic ova were found throughout the lung tissue (see Fig. 3), and in the fluid of the organ. These ova were large, straw-coloured and operculate.

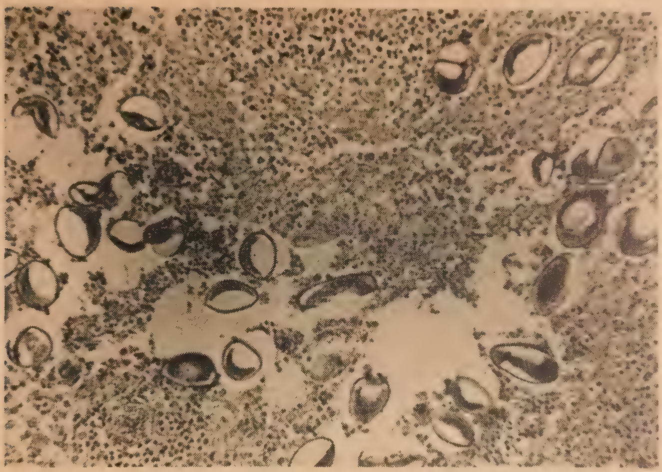
The kidneys showed a heavy, patchy infiltration with mononuclear and polymorphonuclear cells. Blood pigment was present in the tubular epithelium, which showed fatty degeneration and necrosis. Albumin was present in the glomerular space.

Diagnosis

The immediate cause of death appears to have been extreme passive congestion due to heart failure. The fluke infestation was primary. Infection and toxaemia were also present.

Etiology

Forest, Ontario, is close to the Kingsville district in which the snail species *Pomatiopsis lapidaria* has been found. It was revealed that the foxes on the ranch had been fed at various times during the previous spring, summer and autumn on watercress which had been taken from a small stream located in the neighbourhood.



(Original)

Fig. 3. Parasitic ova present throughout the lung tissue of a fox affected with paragonimus trematodes.

A STUDY OF THE TREMATODES

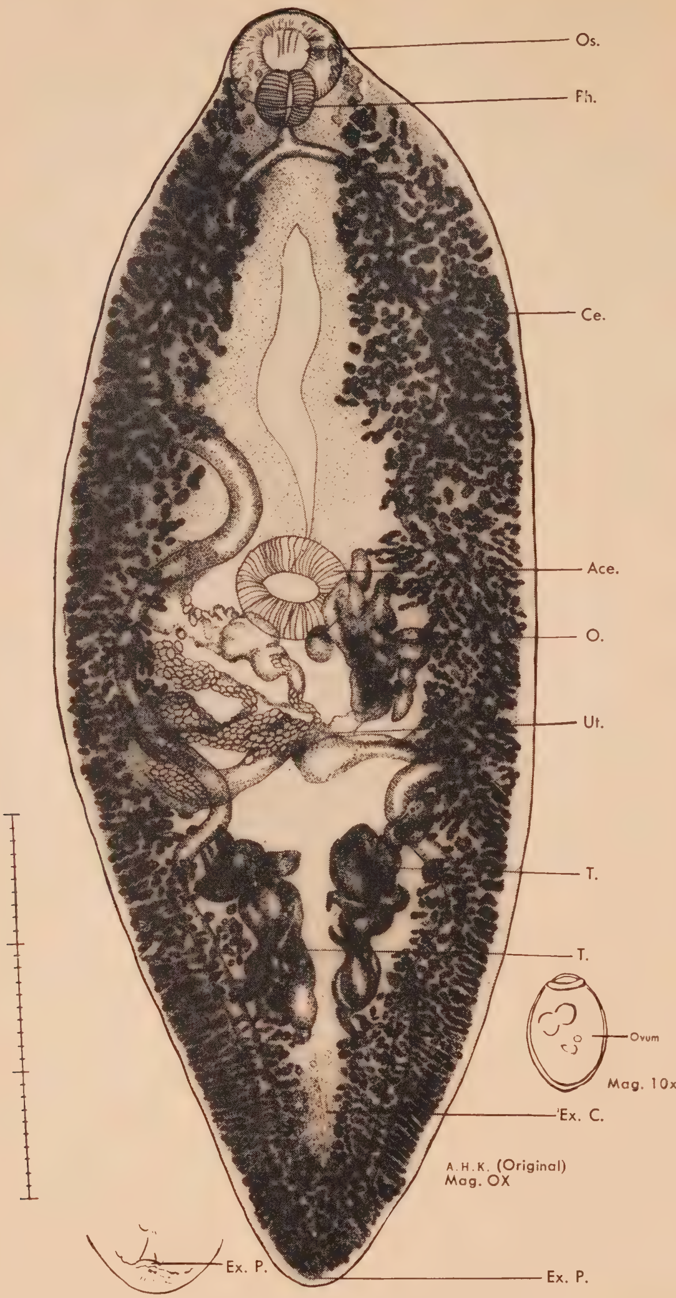
The trematodes were carefully removed from the masses in which they were encapsulated and washed in a warm physiological saline solution to relax their bodies. It was found they were still alive. Each was rounded, fleshy, and blood red in colour. The elongated projectile and contractile movements of their bodies could be observed by placing them in a physiological saline solution in a petri dish, under a dissecting microscope. It was possible to observe also the telescoping movement of the ventral sucker.

The specimens were placed between two glass slides and held in position with a rubber band. Care was taken to ensure that a uniform pressure was applied over the trematode's body to flatten it sufficiently for taxonomical studies. Each pair of slides was then carefully placed in a warm 10.0 per cent formalin solution to fix and preserve the flukes. The specimens were then stained in carmine and mounted *in toto*. Drawings were made (see Fig. 4) with the aid of a camera lucida. A micrometer was used to measure the specimens and their various body organs.

The body of a Paragonimus trematode tapers toward each end, and is 10.366 to 13.700 mm. long. It is 5.210 to 5.538 mm. wide in the region of the ventral sucker. The terminal oral sucker at the anterior end of the fluke is 0.426 to 0.852 mm. long and 0.568 to 0.895 mm. wide. The prepharynx could not be observed in any of the specimens examined. The muscular pharynx is 0.415 to 0.495 mm. long and 0.405 to 0.495 mm. wide. The caeca, connected to the oral sucker by a very short oesophagus, are quite large, undulating, and arise a short distance below the oral sucker, continuing to the posterior end of the body where they end blindly.

The acetabulum, a somewhat larger opening than the oral sucker, is circular, weakly muscular, and situated slightly anterior to the centre of the body. It measures 0.940 to 0.995 mm. in diameter.

The ovary is coiled or branched and lies posteriorly and laterally to the acetabulum, slightly above and opposite the uterus. The uterus is large and



(Original)

Fig. 4. Camera lucida drawing of paragonimus trematode found in the lung of a ranch-raised fox. os — oral sucker; ph — pharynx; ce — caeca; ace — acetabulum; o — ovary; ut — uterus; t — testes; ex c — excretory canal; ex p — excretory pore.

coiled and situated between the acetabulum and testes. The ova are thick-shelled, operculate, and of a dark straw colour. They measure 0.085 to 0.114 mm. long and 0.51 to 0.085 mm. wide. The shell is thickened at the opposite end of the operculum.

The testes are located opposite each other between the middle and posterior thirds of the body, the greater portion being in the lower third of the body. They are somewhat spiraled, elongated and lobed, and the anterior end is larger than the posterior. The lobes appear as long, finger-like projections over the surface of the testes, and are 1.727 to 2.283 mm. long and 0.868 to 0.923 mm. wide. The genital pore is small and lies a little to the right of the acetabulum.

The vitellaria are composed of fairly large follicles extending from the oral sucker to the posterior end of the body.

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LISTERIA MONOCYTOGENES INFECTION IN CHINCHILLAS

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INTRODUCTION

Since the organism now known as *Listeria monocytogenes* was first isolated by Murray, Webb and Swann, in England, in 1926[1], it has been recognized as the cause of infection in many species of animals, both wild and domesticated, in many parts of the world.

In Canada, however, it would appear that the isolation of this organism is rare. Apart from the records of isolation from cattle by Fish and Schroder[2] and from lemming by Plummer and Byrne[3], the only cases in which its isolation is known to the writers are those of a canary and a chicken reported by Bigland[4] of the Veterinary Laboratory, Department of Agriculture, Edmonton, Alberta.

The fact, therefore, that it has been isolated, probably on two occasions and certainly on one, from chinchillas at the Ontario Veterinary College seems worthy of record.

The first and questionable isolation was made in 1947 at this institution. This was recorded by Kennedy[5]. The organism isolated at that time was unfortunately discarded, but the similarity of the symptoms and lesions observed in the

chinchilla on that occasion and the fact that the recorded cultural characteristics of the organism, although incomplete, are identical with those of the organism recorded in this article are together sufficient to convince the authors that the infection on the previous occasion also was listerellosis.

The second outbreak involved two animals only—mates which had been caged together since their purchase by their owner, an Ontario fur rancher, some 14 months previously. The animals were both approximately 18 months of age. The male was the first to show signs of illness and throughout the remainder of this article it will be referred to as Chinchilla No. 1, and the female as Chinchilla No. 2.

CHINCHILLA No. 1

History and Symptoms

The animal had been born on a ranch located in Winnipeg, Manitoba. Later it was purchased by a rancher in eastern Ontario and when at about four months of age it again changed ownership it was taken to the ranch of the last owner, also in Ontario.

The basic ration fed on this ranch was timothy hay and commericial chinchilla cereal pellets. This was frequently supplemented with carrots and occasionally with Pablum, apple boughs and dandelion leaves.

The animals were kept in round, metal cages with wire bottoms. Metal trays, which retained all droppings and other refuse, were fastened under the floors but could readily be removed for cleaning.

About two months prior to its death, Chinchilla No. 1 was noted to be dull. It would eat only part of its ration, and the owner, suspecting intestinal impaction, added flaxseed to its diet. Its condition failed to improve and the amount of faeces was markedly decreased. The faecal pellets were small and hard. A few days before death mineral oil was administered. This had no effect and when the animal was found dead in its cage one morning, it was brought to the Department of Small Domestic and Fur-bearing Animals for autopsy and diagnosis. This was on July 3, 1949.

Pathology

At autopsy it was found that post-mortem change was advanced, but the following observations were made. Multiple pin-point foci of necrosis were present over the surface and throughout the substance of the liver. The spleen was normal in size but showed a few greyish, pin-point, necrotic foci. The bladder wall was thickened and a few necrotic foci were found on the outer surface. Similar foci of necrosis were found in the wall of the small intestine.

Because of the degree of decomposition, it was felt that submission of the tissues to bacteriological or histopathological examination would be of little value. The rancher was instructed to look for signs of illness in his other animals, and if any were observed to bring the animals to the College immediately.

CHINCHILLA No. 2

History and Symptoms

Eight days after the first animal died the rancher noticed that its mate was dull and inactive and had a poor appetite. He therefore brought this animal to the College for examination and treatment.

No evidence of intestinal impaction which was suspected by the owner was found on examination. The faecal pellets were small, shiny, and few in number. The animal appeared to be suffering some pain and would sometimes sit huddled up on her hind legs with the front paws holding the wires at the side of the cage. It seemed that holding the body in an upright position gave the animal ease. As the illness progressed she assumed this position more frequently and for longer periods. The ears drooped and the head was turned upwards and sideways and drawn in to the body (see Fig. 1). The animal sometimes uttered a distressed cry and gritted its teeth.

Fig. 1. Adult female chinchilla showing bunched sitting attitude and drooping ears. Picture taken one and one-half days before death.

The patient would eat little but freshly-plucked dandelion leaves. Three or four days before death she refused all other food. A normal amount of water was consumed.

Ten days after the chinchilla was brought to the College, she would move only when urged. When she did move, the movement was on all four feet instead of a normal hop. Considerable pain was evident and on the day prior to death she uttered a wailing sound almost continually. She died two weeks after admittance.

Histopathology

The autopsy performed on Chinchilla No. 2 revealed multiple, pin-point, greyish foci of necrosis scattered over the surface and throughout the substance of the liver (see Fig. 2.). Macroscopic lesions were observed in no other organs.

Fig. 2. Liver from adult female chinchilla which died from listeria infection.

Microscopic examination showed that the liver cells in these circumscribed areas were disintegrating or had disappeared and were replaced by granular debris, bacteria and inflammatory cells (both mononuclear cells and neutrophils) (see Fig. 3). The liver cells surrounding these foci had undergone degenerative changes.

Fig. 3. Focus of infection in liver. Note disintegration of liver tissues, cell infiltration, and dark clump of bacteria.

Foci of necrosis were also found in the mesenteric lymph nodes. Debris, neutrophils and bacteria replaced the normal architecture of the node in these

areas (see Fig. 4). The only change noted in the brain and meninges was congestion of the blood vessels. In the kidneys the glomerular space and many of the tubules contained pink granular material (albuminous fluid) (See Fig. 5).

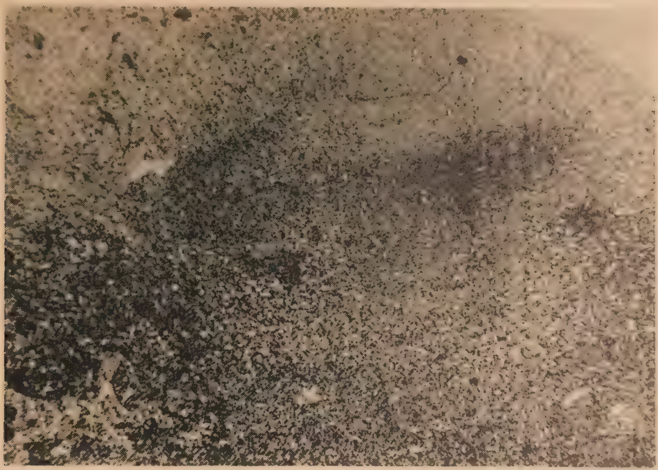

Fig. 4. Area of necrosis and bordering zone of neutrophils in mesenteric lymph node.

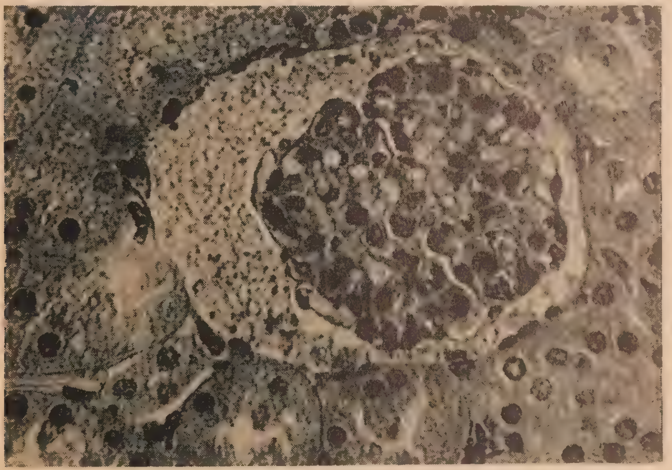

Fig. 5. Albuminous fluid in glomerular space.

An abundance of haemosiderin was present in the normally prominent sinusoids of the spleen.

The pathological changes noted here, with the exception of those in the spleen and kidney, are similar to the lesions in mice reported by Webb and Barber[6]; Wright and McGregor[7]; and Cole[8]; and by Patterson[9]; Gill[10]; Burn[11]; Schultz[12]; and Seastone[13] in rabbits and guinea pigs when infected naturally or by artificial injection with *Listeria monocytogenes*.

Bacteriology

On direct microscopic examination of stained smears made from the necrotic areas in the liver, numerous short gram-positive rods were observed. The same organism was found in smears made from brain tissue (see Fig. 6).

Fig. 6. A DIRECT SMEAR OF BRAIN TISSUE SHOWING A FEW OF THE ORGANISMS FOUND IN THE TISSUE. X 1976.

Fig. 7. A COLONY OF LISTERIA GROWN ON BLOOD AGAR MEDIUM MOUNTED BY THE AGAR FIXATION METHOD FOR DEMONSTRATING COLONIAL DEVELOPMENT. X 72.

Fig. 8. THE PERIPHERY OF THE COLONY IN FIG. 7, SHOWING THE ORGANISM IN DETAIL. X 188

From both of these organs a pure culture was obtained by direct inoculation of the tissue onto blood agar plates. The colonies were circular, smooth and slightly flattened with an entire border (see Figs. 7 and 8). They were transparent by transmitted light and opaque by reflected light. Each colony was surrounded by a narrow zone of clear haemolysis.

The organism was a gram-positive, non-acid-fast rod, 0.4 to 0.5 microns in width and 0.8 to 2.0 microns in length. At incubator temperature it was non-motile, and at room temperature it exhibited a characteristic tumbling motility.

On stab inoculation into the semi-solid gelatin medium of Seastone[13], it produced the type of growth said to be characteristic of *Listeria monocytogenes* with irregular extensions into the medium. (See Fig. 9).

In carbohydrate media no gas was produced. The table below illustrates the biochemical reaction of the organism.

CULTURE	DEXTROSE	RHAMNOSE	SALICIN	DEXTRIN	MALTOSE	LACTOSE	GALACTOSE	ARABINOSE	XYLOSE	MANNITOL	DULCITOL	INULIN	INOSITOL	H_2S	INDOLE	MILK
C49-510	A^1	A^1	A^1	A^1	A^1	A^2	A^2	....	....	....	....	....	....	+	—	Acid

As this organism differed to some extent in biochemical reaction both from the strain which had been isolated in this laboratory by Fish[2] a short time previously and from the description given in the sixth edition of Bergey's Manual of Determinative Bacteriology[14], it was felt that an immunological comparison should be made between the two organisms and between the newly-isolated organism and a stock culture of *Listeria monocytogenes* procured from the American Type Culture Collection. Accordingly three rabbits were immunized, one against each of the three organisms, by injecting a formalized suspension intravenously on three occasions in each case. In every case the resulting antiserum agglutinated not only the homologous organism but also both of the other strains to approximately

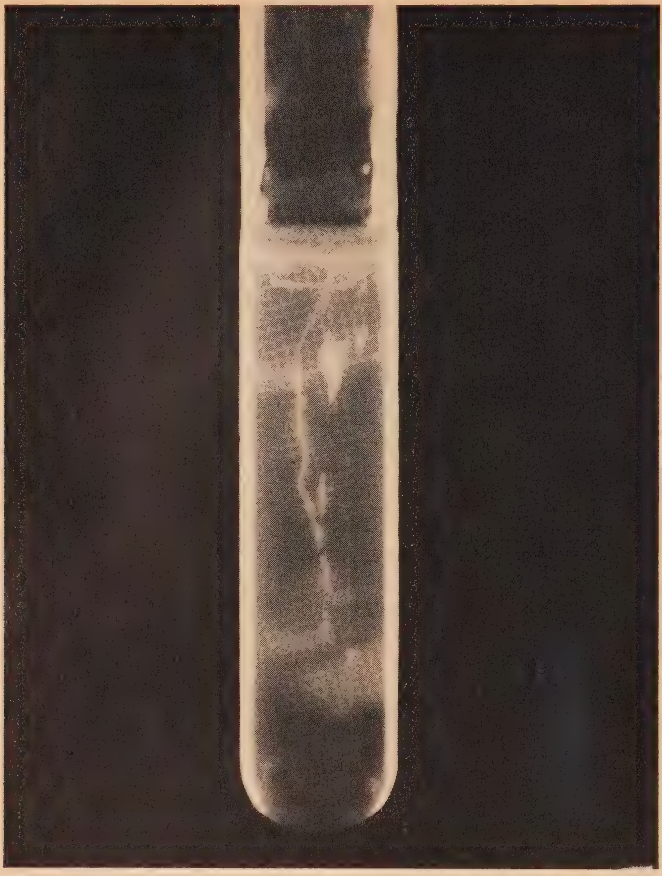

Fig. 9. Photograph of organism described, in semi-solid gelatin agar. Note the granular extensions and puffs along the line of inoculation, typical of *Listeria monocytogenes.*

the same titre. Difference in titre was not observable using the doubling dilution method starting with a dilution of 1:10. In each case, agglutinins were demonstrable in a dilution of 1:640 but not in 1:1280. However, by using other methods it was possible to show that the agglutinins produced were, in each case, demonstrable against the homologous organism in dilutions where they were not demonstrable against either of the other two strains. It was felt, however, that this test justified identification of the organism as *Listeria monocytogenes.*

In pathogenicity the three strains showed definite differences. The stock strain failed to kill any of the rabbits injected. The bovine strain (49-279) killed rabbits injected with 1 cc. of a broth culture in 24 hours or less.

The chinchilla strain (49-510) in the same dose was lethal to rabbits in approximately 72 hours. Before death a remarkable increase in circulating monocytes was demonstrable in the rabbit's blood. After death the organism was recovered in pure culture from the heart blood, the brain and the liver of the rabbit.

DISCUSSION

Two chinchillas which had shown similar symptoms were submitted to the Ontario Veterinary College for diagnosis. One animal lived for a period of two weeks after first symptoms were observed. Autopsy revealed changes such as focal necrosis of the liver which were identical to the lesions produced by *Listeria monocytogenes* infection in rabbits, guinea pigs and mice.

A bacterial organism was isolated in pure culture from one of the animals. and was subjected to extensive procedures for identification. The biochemical reactions produced by this organism were not typical of other reported strains of *L. monocytogenes.* The cultural, tinctorial, morphological and serological characteristics, however, were identical to those of known strains of *L. monocytogenes* which, we feel, justifies identification of this organism as Listeria.

SUMMARY

1. *Listeria monocytogenes* has been isolated from chinchillas showing necrotic foci in the liver.
2. The symptoms observed before death and the histopathological changes found at autopsy are described.

NOTE

After this paper had been prepared for publication, it was brought to the authors' attention that the isolation of *Listeria monocytogenes* from chinchillas had already been reported by Shalkop[15]. A search of the literature has failed to reveal any additional references.

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ONTARIO DEPARTMENT OF AGRICULTURE

Seventy-Fourth Annual Report

OF THE

ONTARIO AGRICULTURAL COLLEGE AND EXPERIMENTAL FARM

1949

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1950

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ONTARIO AGRICULTURAL COLLEGE

Guelph, Ontario,
July 7, 1950.

Honourable T. L. Kennedy,
Minister of Agriculture,
Parliament Buildings,
Toronto, Ontario.

Dear Sir:

I have the honour to submit the Seventy-fourth Annual Report of the Ontario Agricultural College and Experimental Farm, summarizing the work of instruction, research, extension, inspection and other activities in the several departments, together with a detailed financial statement.

Respectfully submitted,

W. R. REEK,
President.

ONTARIO AGRICULTURAL COLLEGE

INTRODUCTION

Although last year's graduating class set an all-time record both for total numbers and the proportion of veterans, more than half of the approximately two hundred members of this year's class are ex-service men and many members of the class are married. These older men have brought to their work a maturity of judgment and a seriousness of purpose not to be found in younger students.

While the total number of students has been less than in the preceding year, new courses have been inaugurated in many departments to provide for the second year of the new Degree Course in Household Science and for the first year of the new five-year course in Veterinary Medicine; most of this new first-year work is taught by members of the O.A.C. Faculty.

Research and extension activities have increased; summaries of the most important will be found in the reports of the various departments. Continued co-operation between departments and also with other groups engaged in agricultural research has shown gratifying results. The work of the committees investigating problems connected with potato scab and legume seed yield is progressing and is reported briefly at the end of this Introduction.

In June the College celebrated its Seventy-fifth Anniversary at ceremonies which were attended by representatives of many Canadian and American universities and by large numbers of alumni and friends. Other meetings of unusual interest held at the College during the year were those of the International Federation of Agricultural Producers and of the American Poultry Science Association. Many other groups have visited the College or made it their meeting place. During the year some 37,000 people visited the campus.

Graduate Courses

Forty students were enrolled for graduate work in twelve departments of the College. Eight of these will complete the requirements for the M.S.A. degree this spring. Several members of the College staff have been on leave of absence to take graduate work in other universities.

General Extension Activities

In addition to their regular work of teaching and investigation, members of the College faculty have been called on to assist individual farmers and rural groups in a variety of ways. Members of various departments have been in great demand as lecturers at meetings of various kinds throughout the Province; others have given assistance in judging of different kinds and in arranging demonstrations. Many thousands of letters and telephone calls requesting information and help have been answered and in addition many problems have been dealt with by personal interview. While all departments render services of this type, in some such work takes up a great deal of the time of the staff. Aside from its value to the individuals and groups concerned, it serves to keep members of the staff in close contact with the people and problems of Ontario farmers.

Buildings and Equipment

Facilities in the meat laboratory have been improved and a new and spacious classroom has been added. As a result of the changes, improved instruction

relating to meats will be possible for both O.A.C. and O.V.C. students and courses of greater practical value in the quality and preparation of meats can now be given to the girls in Macdonald Institute classes. Furthermore, facilities are now available for detailed study of the carcasses of animals which have been used in different feeding experiments.

Renovation of the Poultry Plant during the last two years has involved the tearing down of eight old poultry buildings, dating back as far as 1894, and clearing and levelling in preparation for new buildings, roadways, and campus. A service building, a two-storey brooder house, and four other poultry houses have been erected. Various other buildings have been repaired and remodelled. The basement of the main building has been equipped with chicken and turkey incubator rooms, freezer and cooler rooms, a poultry meat laboratory, and an egg grading laboratory.

In various other buildings the maintenance work of the year included rewiring, adjustments of heating units, and an extensive program of painting.

Residential Accommodation

Over one thousand students of the Ontario Agricultural College, Ontario Veterinary College, and Macdonald Institute were housed in seven residences during the college year as follows: Administration Building, 500; Mills Hall, 200; Macdonald Hall, 125; Watson Hall, 60; Maids' Dormitory, 60; Horticultural Building, 50; Bursar Hall, 30.

Student Activities

Continued co-operation among the students of the Ontario Agricultural College, the Ontario Veterinary College, and Macdonald Institute has produced very fine results in all branches of student activity. The work of the various Students' Councils and the programs of the College Royal and Students' Christian Movement have been carried out with marked success. In addition to the regular Sunday evening series of Nine O'clocks, three special Sunday evening concerts were presented by the Philharmonic Society, two by the Choral Club and one by the College Band.

The Union Literary Society has just completed one of the most successful years in its history. The inter-year debating series was the most extensive that has ever been carried out and had excellent support from the student body. Inter-university results are given in the following section. In dramatics unusually fine productions of two plays achieved a standard of excellence and of popularity which it will be difficult to surpass. The unusually large number of students participating in these activities was most gratifying.

Inter-University Debating

For the second time in the past three years the O.A.C.-O.V.C. debating team has won the I.U.D.L. Trophy, symbol of victory in the Inter-University Debating League of Ontario and Quebec. In the first round they defeated Queen's and McMaster Universities, and in the final round, Loyola College. As representatives of the I.U.D.L. in the Dominion finals held in Ottawa, they lost a two-to-one decision to the Dominion champions, the powerful University of British Columbia team, one of whose members is an ex-member of the Dominion House of Commons. In an exchange with Wayne University, Detroit, they brought the first American team to the campus since before the war, and won an audience decision against them.

Military and Naval Training

The O.A.C. Contingent of the Canadian Officers Training Corps continued to train officers for commission in the Canadian Army. Rigid selection of applicants resulted in a high standard of achievement at the Corps Training Schools. All Officer Cadets from this Contingent successfully completed this training.

The University Naval Training Division completed a very satisfactory year. The high calibre of the students in this Division is demonstrated by the promotion records. Without exception, every man was advanced during the year, some to the rank of Cadet, and others to Sub-Lieutenant R.C.N.(R).

Legume Research Committee

The research during 1949 continued to focus attention on factors affecting seed yield of alsike clover. In spite of the dry summer weather which affected many projects directly concerned with field plots, significant progress was made in the research program. The co-operative manner of approach to the problem has been largely responsible for the progress achieved. This report concerns some phases of the research which yielded positive results during 1949. Further details are given in the reports by the departments concerned.

Destructive Insects — The European clover-seed weevil is undoubtedly the most important insect involved in the reduction of alsike seed yields in the more southerly portion of Old Ontario. A DDT application when the alsike begins to flower has practical value in preventing loss from this insect providing other conditions are not major limiting factors in seed yield.

Effect of insecticides on the Honeybee —The effects of various insecticides on the gut of the honeybee are being investigated. There are some indications that DDT may have a slight transient repellency to the honeybee, but it would appear that DDT is non-toxic to foraging bees provided it is applied according to recommendations. On certain field plots DDT appeared to increase the amount of bloom with a subsequent increase in bee population.

Pollination — The honeybee is a major pollinator, not only for alsike but also for red, white dutch, and sweet clover. Preference by the honeybee, as indicated by activity, would place the aforementioned clovers in the following order: sweet clover, alsike, white dutch, and red clover. Temperature influences nectar concentration and pollinator population in the field. A method for marking bees with fluorescein was devised and employed. Cross pollination of Hairy Vetch results in a much higher seed yield than does self-pollination.

Nutrition — Tissue analyses of alsike plants from reputedly poor seed-yielding areas do not indicate deficiency of boron or zinc. Artificially induced boron deficiency of Hairy Vetch markedly reduces or else completely prevents flower production. In a survey of some sweet clover fields, the good stands were invariably found where they were well supplied with available calcium and magnesium. During 1949, available soil moisture was a major limiting factor in the growth of alsike.

Legume Nodulation — Strains of root-nodule bacteria in relation to efficiency in nitrogen fixation are being investigated. Preliminary studies indicate that some strains of bacteria are more efficient than others and that efficient nodulation is more pronounced in some legumes than in others.

Harvesting Methods — Direct combining gives a low recovery of alsike seed compared to cutting, windrowing, allowing to dry, then pick-up combining.

Ways and means to handle windrows under varying weather conditions for maximum seed recovery are being investigated.

Extension Release — Based on investigations to date, a circular has been prepared dealing with the importance of the honeybee in the pollination of alsike clover, control of injurious insects on alsike clover, and improving combine recovery of alsike seed.

The Potato Scab Project

During 1949 the project was continued as a co-operative effort on the part of various departments at the Ontario Agricultural College, the Dominion Laboratory of Plant Pathology, St. Catharines, and the Department of Botany, University of Western Ontario.

A field research unit was established by rental for five years of two and one-half acres of land known to give a high incidence of scabby potatoes. This land is being used to determine the influence of various cultural and crop rotation practices on scab incidence. The turning under of two or more green crops of soybeans prior to a potato crop shows promise as a means to reduce the amount of scab. Scab is less prevalent in soil where the *p*H is below 6.

Other research in progress concerns the identification of parasitic forms of the scab organism and the role of strains; the method by which the organism causes scab; the possibility of using other fungi as antagonists to the scab organism; the nature of the products of decomposing soybeans; and the testing of potato seedlings and varieties that show resistance to scab. All these phases of research have a direct bearing on the general scab-control problem.

COURSES AND ATTENDANCE

Ontario Agricultural College

The enrolment in the regular courses in Agriculture was 685. Of this number, 647 are from Ontario, 17 from the other provinces, and 21 from other countries.

From Other Provinces of the Dominion

Alberta	4	New Brunswick	1	Prince Edward Island	1
British Columbia	2	Newfoundland	1	Quebec	3
Manitoba	1	Nova Scotia	2	Saskatchewan	2

From Other Countries

British Guiana	1	Colombia	1	Scotland	2
Br. West Indies	2	England	5	U.S.A.	3
Central America	2	Holland	4	Wales	1

Summer courses for teachers in Agriculture were given in July and August with an enrolment of 97. Other short courses, varying in length from a few days to three months, were held at different periods throughout the year. Included in these were regular and special short courses in the Poultry Department with an enrolment of 40, and regular and special short courses in the Department of Dairying with an enrolment of 85. Special courses were given in Agricultural Economics, Athletic Coaching, Beekeeping, Community Programs, Farm Mechanics, Horticulture, Live Stock, and Soils and Crops, with a total enrolment of 710; miscellaneous courses, with a total attendance of 683, included the following: a Mould Count School, a course for Commercial Florists, a Course for Commercial Nurserymen, a Drainage Course, a Course for Gladiolus Growers, a School for Canners' Fieldmen, Royal Canadian Golf Association Greenskeepers School, Plant Food Producers' School, and a Course for Dairy Herd Supervisors. The total attendance in special and short courses was 1,615; the grand total attendance in all courses was 2,300.

Macdonald Institute

The total attendance for the year at Macdonald Institute was 127, of whom 71 were enrolled in the One Year Diploma Course, and 56 in the first two years of the newly established Degree Course in Home Economics.

Report of Chaplain and Lecturer

At the end of his first year's services with the College the Chaplain and Lecturer reports that regular undenominational church services were conducted throughout the academic year as well as Bible study groups and discussion groups arranged with the Students' Christian Movement. Personal interviews were held with 220 students. In addition the Chaplain acted as religious adviser

at the Junior Farmers' Provincial Camp and addressed six Rural Life Conferences, six Junior Farmer Services, and four Rural Life Services.

His extension and public relations activities included:

addresses at 68 meetings throughout Ontario;

addresses at 7 high school commencements, 3 teachers' organizations, 4 vocational guidance nights;

assistance with C.N.E. and Royal Exhibits;
judging at 8 fall fairs.

IMPORTANT EVENTS OF THE COLLEGE YEAR

Seventy-fifth Anniversary and Annual Alumni Reunion

The Seventy-fifth Anniversary of the founding of the College was celebrated on June 18, 1949. At the same time was held the annual reunion for the alumni of the Ontario Agricultural College and the alumnae of Macdonald Institute. In addition to other guests and distinguished visitors, approximately 1,500 former students were present.

A special Anniversary Luncheon in Creelman Hall was addressed by Colonel the Honourable Thomas L. Kennedy, Minister of Agriculture for Ontario. The Anniversary ceremony began at 3:00 p.m., when official representatives of thirty-two Canadian and American universities joined the staff of the O.A.C. in an academic procession to Memorial Hall. With Dr. W. R. Reek, President of Ontario Agricultural College, presiding, addresses of greeting and congratulation were given by Dr. Sidney E. Smith, President of the University of Toronto, on behalf of that university; by Dr. George P. Gilmour, President of McMaster University, on behalf of the Canadian universities; and by Dr. F. B. Hutt, Professor of Animal Genetics in Cornell University, on behalf of Cornell and the American universities and also on behalf of O.A.C. alumni. The meeting was also addressed by Dr. G. I. Christie, President Emeritus, whose portrait was presented to the College on behalf of the Alumni Association by its president, Mr. F. W. Presant.

I.F.A.P. Conference Meets in Guelph

The Ontario Agricultural College was the scene of the Third Annual General meeting of the International Federation of Agricultural Producers from May 31 to June 10, 1949. Delegates representing farmer organizations from all parts of the world attended. Plenary sessions were presided over by Sir James Turner, I.F.A.P. president, and a considerable number of Ontario farm people took advantage of the unique opportunity to be present at the deliberations of an international body. Countries sending delegations or observers included Belgium, Canada, Chile, China, Costa Rica, Denmark, Finland, France, Western Germany, Jamaica, Japan, India, Iceland, Kenya, Luxembourg, Switzerland, New Zealand, Netherlands, Norway, South Africa, Southern Rhodesia, Sweden, United Kingdom, United States. The president of the Canadian Federation of Agriculture, Dr. H. H. Hannam, a graduate of the O.A.C., was elected to succeed Sir James Turner as president.

Highlights of the conference were the addresses of Sir James Turner, President; Dr. G. S. H. Barton, executive assistant to Rt. Hon. J. G. Gardiner, Federal Minister of Agriculture, Canada; Albert S. Goss, Master of the National Grange, Washington, D.C.; and Professor N. G. Ranga, representing the India Kisan Congress.

O.A.C. President Receives Honorary Degree

In recognition of his outstanding services to Canadian agriculture, Mr. W. R. Reek, M.B.E., B.S.A., President of the Ontario Agricultural College, was granted the honorary degree of Doctor of Laws by the University of Western Ontario at the Commencement held on June 5, 1949. During the course of a long career in agriculture, Dr. Reek has occupied various teaching and administrative positions, including those of Assistant Agent-General for Ontario in Great Britain, Director of Agricultural Education in Prince Edward Island,

Deputy Minister of Agriculture for New Brunswick, Assistant Live Stock Commissioner for the Dominion Government, and Deputy Minister of Agriculture for Ontario. For the past five years he has been President of the Ontario Agricultural College. In the King's Honours List of June, 1946, the value of his contribution to Canadian agriculture was recognized when he was made a Member of the Order of the British Empire.

American Poultry Science Association

The 38th Annual Convention of the Poultry Science Association was held July 31st to August 5th at the Ontario Agricultural College with an attendance of over 750 poultry specialists and their families from all parts of Canada and the United States. Dr. W. R. Graham, former head of the Department of Poultry Husbandry at the O.A.C., was one of the three founders of the association who were honoured at this meeting.

Officers' Conference, Federated Women's Institutes of Ontario

The first officers' conference of the Federated Women's Institutes of Ontario was held at the O.A.C., May 2nd to May 6th with six hundred presidents, secretaries, and other officers of the various branches in attendance. Guest speakers were Miss Mary L. Collings, Senior Home Economist, Department of Extension, Washington, D.C.; Miss Gay Moore, Hostess, Royal York Hotel, Toronto; and the Honourable T. L. Kennedy, Minister of Agriculture.

Meetings of Various Groups and Conferences

The following were some of the many meetings and conferences held at the Ontario Agricultural College this year: Women's Institute Rallies; Inter-County Holstein Day; various other field days; Poultry and Nutrition Conference; Hamilton Conference Young People; School Principals and Vocational Guidance Teachers; Agricultural Representatives; and Club Leaders, Department of Agriculture.

Judging Competitions

Three teams from the Ontario Agricultural College, coached by the staff of the Department of Animal Husbandry, represented Canada at the National Intercollegiate Dairy Cattle Judging Contest, Waterloo, Iowa, at the Collegiate Live Stock Judging Contest held in connection with the International Live Stock Exposition, and at the International Intercollegiate Meat Judging Contest at the same show. As teams, they made quite a creditable showing, and there were several individuals on the teams who brought honours back to Ontario. A team of four students coached by the staff of the Department of Dairying took part in the Intercollegiate Dairy Products Judging Contest held at Springfield, Mass., on September 20, 1949. In competition with nine universities the O.A.C. team did creditable work especially in judging market milk and ice cream.

Junior Farmers

Over 500 delegates attended the annual meeting of the Ontario Junior Farmers' Association held at the Ontario Agricultural College on April 24-26. On June 23, 1949, the Junior Farmers held their annual Regional Field Day at the College, with approximately 1,500 in attendance. On October 21, about

600 Junior Farmers assembled at the College for the Inter-County Junior Farmer Judging Competitions. On other occasions Junior Farmers, totalling 1,100, visited the College.

Farm and Home Week

Farmers' Week was held June 13-17. All departments of the College contributed, and the well-planned exhibits and visual demonstrations aroused favourable comment from many of the visitors. Approximately 19,000 attended.

Distinguished Visitors

Included in the list of distinguished visitors to the Ontario Agricultural College were Dr. R. A. Fisher, Professor of Genetics at the University of Cambridge; Louis Bromfield, famous author and lecturer; Sir William Ogg, Director of Rothamsted Experimental Station; and Alex Hobson, Secretary, Royal Agricultural Society of England.

School Groups

On May 18 the College played host to about 690 teachers-in-training from the Normal Schools of Hamilton, London, Stratford, and Toronto. During the month of May more than 600 secondary and public school students visited the College.

COLLEGE FUNCTIONS

Baccalaureate Service

The annual Baccalaureate Service for the graduating classes of the Ontario Agricultural College and the Ontario Veterinary College was held in War Memorial Hall on Sunday, April 3, 1949.

Right Reverend George H. Luxton, Bishop of Huron, delivered the sermon.

Diploma Course Graduation

On April 8, 1949, graduation exercises were held for the senior class of the Two Year Diploma Course. It was the first class to complete the new two-year practical agricultural course.

Mr. J. A. Garner, Director of Extension for the Ontario Department of Agriculture was chief speaker at the ceremony held in the College Cafeteria when diplomas were presented to the forty students who successfully completed the two-year course.

Convocation for Students in Agriculture

The first outdoor ceremony in the seventy-five year history of the Ontario Agricultural College, held on Wednesday, May 25, 1949, saw the largest class in history, 256 students, receive degrees of Bachelor of Science in Agriculture from Rt. Hon. Vincent Massey, Chancellor of the University of Toronto.

Addresses were delivered by Chancellor Massey and Dr. Samuel Beattie, Dean of the Faculty of Arts, University of Toronto.

Macdonald Institute Graduation

At the graduation ceremonies for students of Macdonald Institute held in War Memorial Hall on May 27th, 1949, 54 girls received diplomas presented by Mr. W. R. Reek, President of the Ontario Agricultural College.

Mr. C. D. Graham, Deputy Minister of Agriculture, extended greetings to the class on behalf of the Ontario Government, and Mrs. D. B. Shutt of Guelph, a graduate of Macdonald Institute, delivered the address.

SCHOLARSHIPS, PRIZES AND GIFTS

Aluminium Laboratories Research Scholarship

To enable studies to be undertaken in regard to the merits of aluminium in the production, transportation, and processing of dairy products, Aluminium Laboratories Limited have established a research scholarship in the Department of Dairying. The scholarship will be offered up to a period of four successive years at $1,000.00 a year. In addition a fund of up to $6,000.00 will be available to cover the cost of travelling expenses and special equipment which may be required.

Roses Incorporated Fellowship

A fellowship of $1,200.00 in the Department of Horticulture has been donated by Roses Incorporated to provide for work on the storage and shipping of roses.

Canada Packers Limited Fellowship

Canada Packers Limited have presented the College with $1,000.00 for the continuance of the fellowship previously established for studies in grassland work.

B. H. Bull and Sons Fellowship

B. H. Bull and Sons of Brampton, Ontario, have presented the College with $1,000.00 for the continuance of the fellowship previously established in pasture improvement.

Merck and Company Grant

A grant of $275.00 has been made by Merck and Company Limited for work on the Animal Protein Factor to be carried on in the Department of Animal Nutrition.

Peterborough Rotary Club Prize in Public Speaking

The Peterborough Rotary Club held a Peterborough County Public Speaking Contest in 1946 and offered a prize of $100.00 to the winner to assist him in entering the First Year in a University Course. The money was not to be paid until the winner entered a University. The student entered the First Year of the O.A.C. Degree Course in September, 1949.

Kent County Scholarship

The sum of $50.00 has been awarded by the Kent County Council for 1950 only to a Kent County student in the First Year of the Associate Class at the Ontario Agricultural College.

Prizes of the Minister of Switzerland in Canada

The Minister of Switzerland in Canada now offers annual prizes to students in the Third or Fourth Years who have distinguished themselves in reading Scientific French.

The prizes consist of a series of books, written by the best Swiss authors of the French language, or by some well known foreign authors who have written about Switzerland. The books will be selected each year by the Department

of English from a list submitted by the Swiss Minister. The awards will be made by the Department of English.

F. K. Morrow Scholarship

Mr. F. K. Morrow, a member of the Executive Committee of the Royal Winter Fair, has deposited a sum of money with the Treasurer of Ontario, to be expended at the rate of $150.00 in 1950, and $300.00 annually thereafter, until the fund has been exhausted or replenished. The winner of this award will be chosen from among the contestants in the Inter-County Live Stock Judging Competition at the Royal Winter Fair.

The award must be used to help defray the registration fees, board and lodging of the winner, while pursuing studies in the Associate Diploma Course at the Ontario Agricultural College, Guelph, or at the Kemptville Agricultural School.

Portrait of Dr. G. I. Christie

At the celebration of the Seventy-fifth Anniversary of the founding of the College which was held in Memorial Hall on June 18, 1949, a portrait of Dr. G. I. Christie, President Emeritus, was presented to the College by the Alumni Association. The portrait was painted by Evan Macdonald.

W. C. Maxwell Prize in English

An annual prize of $25.00 has been established by W. C. Maxwell, D.F.C., of the Mutual Life Assurance Company of Canada. The prize is awarded to a student at the end of his Fourth Year who having obtained at least 75 per cent in his Third and Fourth Year examinations in English is selected by the staff of the Department of English for having taken an active part in the work of at least one of the following student organizations: The Union Literary and Dramatic Society, The Philharmonic Society, and The O.A.C. Review.

Tower Clock

A clock has now been installed in the central tower of the Administration Building as a Memorial to Year '49. Funds contributed for this purpose by members of the Year were reported last year.

Guelph Little Theatre Grants to Student Societies

Grants of $25.00 each were made by the Guelph Little Theatre to the student societies carrying on work in dramatics and music.

Conversat Committee Gift

The sum of $100.00 to be used for some purpose in the projected Students' Union Building was presented by the O.A.C.-O.V.C. Conversat Committee of 1950.

Athletic Trophies

Two new trophies were donated for the encouragement of intramural athletics. E. Banting, Year '50, presented the Banting Trophy for Intramural Curling; W. Van Norman, O.A.C., presented the Van Norman Trophy for Intramural Volleyball.

CHANGES IN SENIOR STAFF

Appointments

May 1, 1949	Rev. William A. Young, B.S.A., B.D., Chaplain and Lecturer.
Aug. 1, 1949	Ford Andrew Stinson, B.S.A., M.S.A., Ph.D., Professor and Head of Department of Soils.
Aug. 1, 1949	Margaret S. McCready, B.A., Ph.D., Principal, Macdonald Institute.
Aug. 8, 1949	Walter Edward Heming, B.S.A., Ph.D., Associate Professor, Department of Entomology.
Oct. 1, 1949	Stewart H. Lane, B.S.A., M.Sc., Associate Professor, Department of Agricultural Economics.
Oct. 10, 1949	Frederick N. Jerome, B.S.A., M.S.A., Associate Professor, Department of Poultry.

Promotions

April 1, 1949

Department of Agricultural Economics

Riley, Charles Wilson from Associate Professor to Professor.

Department of Agricultural Engineering

Ferguson, Fred L. from Associate Professor to Professor.

Department of Animal Husbandry

Raithby, George E. from Professor to Professor and Assistant Head of Department.

Stillwell, Erwin C. from Associate Professor to Professor.

Department of Animal Nutrition

Hill, Douglas Calvert from Associate Professor to Professor.

Motzok, Ilary from Associate Professor to Professor.

Department of Bacteriology

Chase, Francis Edward from Assistant Professor to Associate Professor.

McDermott, Lawrence A. from Assistant Professor to Associate Professor.

Shutt, Donald B. from Assistant Professor to Associate Professor.

Wright, Merritt Lyle from Assistant Professor to Associate Professor.

Department of Botany

Montgomery, Frederick H. from Assistant Professor to Associate Professor.

Wellwood, Arnold A. from Assistant Professor to Associate Professor.

Department of Dairying

Irvine, Owen R. from Assistant Professor to Associate Professor.

Department of Entomology and Zoology

McNally, A. Gordon from Assistant Professor to Associate Professor.

Department of Horticulture

Graham, Thomas O. from Associate Professor to Professor.

Department of Poultry

Slinger, Stanley James from Associate Professor to Professor.

Department of Home Economics
Macdonald Institute

Lindsley, Dorothy M. from Assistant Professor to Associate Professor.

Sept. 1, 1949

Department of Entomology

Oughton, John G. from Assistant Professor to Professor.

Transfers

July 1, 1949 Dr. J. H. L. Truscott, Professor, Department of Horticulture, to Horticultural Experiment Station, Vineland, Ontario.

Resignations

Oct. 31, 1949 Miss D. M. Lindsley, Associate Director, Department of Home Economics, Macdonald Institute.

Superannuations

Oct. 31, 1949 Professor A. T. Davey, Department of Bacteriology.

Deaths

June 12, 1949 W. M. Gammon, B.S.A., Assistant Professor, Department c Botany.

DEPARTMENT OF AGRICULTURAL ECONOMICS

Instruction in courses offered to the Economics Option as well as to students in various years in the Degree Course continues to occupy a major portion of the time of the staff of the Department. The numbers of students enrolled in the Economics Option continued at relatively high levels, with 23 graduating in 1949 and an equal number in 1950. To date Economics graduates have been placed readily in various fields of government, private business, and co-operatives.

Graduate courses in Agricultural Economics were initiated in the Department in 1949-50, and it is expected that the enrolment of increasing numbers of graduate students will entail additional responsibilities, but should make possible a more extensive research program.

Research and Extension

Farm Account Books from co-operating farmers in 23 counties of Ontario were received in the office for analysis during the first few weeks of 1950. This, the fourth year of a continuing project, was marked by a substantial increase in participants, representative of a variety of type-of-farming areas. As a result the detailed farm business analysis conducted on these records should be of increased value. The value of the services of a full-time farm management extension specialist is now being reflected not only in a larger group of co-operators, but by a more intensive follow-up of results, and a more widespread dissemination of farm management information through regional short courses, press releases, and farm broadcasts. A renewed interest in farm records and farm business practices is evident throughout the Province.

A mimeographed bulletin on "Family Farm Business Arrangements In Ontario" was prepared during the summer of 1949, following more than two years of preliminary study of the important twin problems involved in sharing the income of the family farm and transferring it to the next generation. This bulletin which suggests practical solutions to the problem has already been used as study material by many Junior Farmer groups and will be prepared for printing at an early date. An early start is planned on a bulletin dealing with farm rental contracts.

While farm appraisals are required to be made for a variety of purposes in Ontario, including the fields of farm credit and tax assessment, little has been done to date to develop uniform and efficient methods. More recently Chapters of the Appraisal Institute of Canada have been organized within the Province, and a Farm Appraisal Short Course is now scheduled to be held at the Ontario Agricultural College in the spring of 1951. The Department has been asked to co-operate with the Departments of Soils and Agricultural Engineering in developing the course syllabus. Research designed to suggest better appraisal methods is currently under way.

A problem of current concern is the movement of farm population out of the agricultural industry. During the summer of 1949 this department co-operated with the Economics Division of the Dominion Department of Agriculture in a farm population survey in Dundas County. This study involved the re-visiting of some 184 farms covered in a farm management survey of 1917, with the object of discovering whether or not the farms had remained in the same family, and what had happened to members of these families not now on the farms. Follow-up questionnaires were sent to those living in urban centres with the object of discovering certain facts influencing their choice of

occupations. The analysis of these data is now proceeding under the direction of a member of the Department, and promises to reveal some interesting facts about why people leave farms and where they go.

Two staff members in recent months have been undertaking studies relative to the consumption of dairy products in Ontario, more particularly butter, cheese, and to some extent fluid milk. The elasticity of demand for these products has an important bearing on the possible adjustments of the dairy industry in the light of margarine competition. It is also a consideration in the light of increased appropriations currently being set aside by the dairy industry for advertising.

The Department is now committed to undertake a study of certain practical business problems confronting Ontario farm co-operatives. Under the direction of a member of the Department, field enumerators will visit all the local co-operative purchasing organizations in the Province during the summer of 1950 to collect the required information for study and analysis. An objective report will be prepared on the basis of these data.

In addition to the foregoing projects, the Department deals with many requests from farmers on a wide variety of topics ranging from preparing income tax forms to the selection, purchase, and financing of farms. Numerous personal interviews have been arranged with people having family farm business problems, or problems in farm organization and management.

This department, while not undertaking cost of production studies recently on its own account, has continued to lend close co-operation wherever possible to the Farm Economics Branch at Toronto. Similar relationships exist with the Economics Division of the Dominion Department of Agriculture at Ottawa.

H. K. LECKIE,

Acting Head of Department.

DEPARTMENT OF AGRICULTURAL ENGINEERING

Extension Services and Demonstrations

The staff of the Department assisted in organizing and carrying out Grassland Days at Peterboro, Cornwall, and Thamesford. These events, which included machinery displays, demonstrations, and agricultural exhibits, attracted large crowds of spectators.

Considerable assistance, advice, and co-operation were provided in organizing and carrying out Canada's first Soil Conservation and Farm Improvement Field Day. This was a one-day "face-lifting" project on the farm of Heber Down at Brooklyn, Ontario County, September 8. A completely co-ordinated conservation program, outlined by the Department of Soils, was instituted which covered strip cropping, terracing, contour plowing, grassed waterways, and other conservation practices. Many improvements to the farm were carried out during the day. The creek banks were straigthened and levelled off, fence-rows were removed and new fences built. The old barn and the chicken coop were entirely remodelled, and the barnyard was filled and levelled. The buildings were painted on the exterior and whitewashed on the interior. A complete system of tiled drains was installed to drain the wet areas in the main field and the renovated pasture. An estimated 12,000 persons attended this event.

Contour plowing demonstrations were conducted at the International Plowing Match at Burford and at the County Match of King and Vaughan near Maple.

The annual O.A.C. Agricultural Engineering Student Contour Plowing Match was held on the College farm, and attracted many local farmers, as well as Junior Farmers who were at the College at a Conference.

Many counties have been assisted by members of this department in carrying out Short Course programs during the winter months.

Rapid mechanization of Ontario farms has led to a demand for Tractor Maintenance Clubs. Eight counties organized clubs during the year. These clubs were established through the Canadian Boys and Girls Club Organization and in co-operation with the Extension Department at Toronto. The Club has had an average enrolment of 18, with age limits between 14 and 21 years. Monthly lectures and demonstrations were given to each club and each boy was visited on his own farm by the instructor. An Achievement Day consisting of an examination, a defects test, and a safe driving test was carried out at the conclusion of the year. A Junior Farmers' Machinery Project was also formulated and supervised by this department. This covers proper maintenance, adjustment and operation of farm machines. It was concluded by a Provincial safe driving and machine defects test held at the Coliseum, in conjunction with the annual convention of the Ontario Retail Farm Equipment Dealers' Association.

Bulletin No. 471 entitled "Rural Sewage Disposal" was prepared and printed for distribution late in the year. This has proved to be a very popular bulletin, and the demand for it has been Dominion-wide.

Legume Seed Harvesting Machinery (Legume Research Committee.)

Carefully conducted field tests comparing three methods of combining legume seed were carried out. Two new machines were used in preparing the crop. Comparison of the amounts of seed recovered by these different methods, as employed in the same uniform field of alfalfa, confirmed the following conclusions:

Early Windrowing with subsequent pick-up combining recovered double the pounds of seed per acre that direct combining saved.

Early Mowing with swaths roto-raked into windrows, when pick-up combined, recovered one-third more seed than direct combining.

The delay necessary for standing crops to reach ordinary direct combinable condition is responsible for very heavy seed losses through shattering by weather.

Starling Control

Carbide exploders were tested in protecting the ten acre, sour cherry orchard of Mr. George Atkins, Bronte, from starling damage. The two units were operated for 23 days. Mr. Atkins gives this device credit for saving his crop. The starlings showed no sign of becoming accustomed to the explosions.

Barn Paint Studies

Comparative tests of durability of paints and paint combinations in protecting corroded metal roofs are being carried out. The roof of one of the College buildings has been laid out in 28 panels. Eighteen paints and primers, applied singly and in combination, are now under test. Provision is made to include other paints as they become available.

Barn Hay Driers

A divided main system barn hay drier, employing a 14,000 c.f.m. centrifugal fan, was designed and installed in a 38′ x 50′ mow on the farm of Charles Binkley at Waterdown. The system used a slatted floor system on half the barn, and lateral ducts on the other half. Cut alfalfa hay, with a moisture content of about 45 per cent, was placed on the system early in June. Despite difficulties encountered, because of faulty management and breakdown of the gasoline motor on the fan early in the curing period, the hay cured was fairly satisfactory and was fed with very little waste.

Dairy Barn Ventilation Studies

The experimental heat exchanger ventilation unit was remodelled to incorporate counter flow air movement within the unit and to utilize individual motors on the exhaust and inlet fans. The unit was also placed in the mow and covered with hay. Temperature and humidity readings taken have shown that the actual heat transfer from the system is 150-200 per cent of the theoretical design values. The unit maintained very satisfactory temperature and humidity conditions throughout the working season.

Comparative Insulation Studies

Plywood panels incorporating various insulating materials have been installed in the Dairy Barn. Tests are being conducted on these panels to compare the insulating values of the various materials under high humidity conditions, and to check these values with the values determined by the "hot plate" method in the laboratory. Thermocouples are used to record the temperatures through the various panels. The actual insulation materials used are Fibrefill, Fibreglass, and Reflective Aluminum Foil.

Tillage Machinery Project

Long term research into the effects of various tillage implements is being conducted on heavy soils on the farm of W. E. Brecken at Bronte and the Auld

College Farm. The objectives are to determine, (a) soil conditions most suitable for the growing of certain crops, (b) effects of various types of tillage machine on soil structure and resulting crop yield when used in a good soil building crop rotation, and (c) mechanical and economic factors involved in the machinery operations required to produce crops in rotation. Fields are laid out in four, five, and six-year rotations, and the plots within the rotation are approximately one-tenth of an acre in size. The tillage machines used in the study are the moldboard plow, the disk plow, one-way disk, and rotary tillage equipment. This is a co-operative project with the Departments of Soils and Field Husbandry.

Machine Design Projects

Drier for O.A.C. Hot Water Heater for Loose Smut—A high capacity air-blast drier has been partially completed, and will be tested next spring. It is designed to dry the treated grain sufficiently that it may be stored safely in bags for a week or two before seeding.

Cultipacker Seeder for Pasture Grasses—The reworked design has been subjected to approximately 80 acres of test seeding this year. Further minor modifications will be completed before comparative tests in 1950.

Wagon Unloaders—The folded canvas type unloader was subjected to tests and proved satisfactory although somewhat short-lived. A flight conveyor type unloader requires further modification.

Portable Plot Thresher—To facilitate accurate, on-the-spot harvesting of experimental grain plots, the C.E.F. design Cyclone Plot thresher, previously constructed here, was reworked to provide a more functional, portable unit. The new form is highly successful.

Portable Soybean Plot Thresher—To harvest the ever-increasing number of soybean experimental plots, plans were obtained from the Delta Experimental Station, Mississippi State, and a machine constructed here which gave excellent service during 1949. Further modifications, now completed, are expected to make this machine even more effective.

Mechanical Agitator for Soil Analysis—The original design, developed in this department, has been reworked for simplification and ease of cleaning. Two more machines of the improved design have been constructed locally for use at Harrow and Vineland.

Dual Pressure Equipment for Weed Sprayers—A simple arrangement of regulators providing alternative high or low pressure for demonstration weed spraying equipment has been worked out and applied to two different makes of machine for the Crops, Weeds, and Seeds Branch.

Community Playground Equipment—Several designs of swings, teeter-totters and other equipment have been produced from scrap pipe metal for the College Playground Committee. These designs lend themselves to welded construction at very low cost.

Potato Digger for Plot Harvesting—The original model of this mounted digger has had pneumatic tires added for increased stability, and has proved highly successful. Blueprints of the improved design have been supplied to the Central Experimental Farm on its request, for use throughout Canada.

Massey Harris "44" Loader—Various modifications and improvements have

been made to the coal scoop and mechanism of the hydraulic front end loader for service in coal and ash handling. The unit has handled the coal and ashes for the power house very satisfactorily.

Innumerable other small fabrication and construction projects have been built for other departments, and many machines and pieces of equipment have been prepared and overhauled during the year. The shop facilities and service are in great demand at all times of the year.

Building Construction Projects

A one-storey laboratory and office building, 24′ x 48′, was constructed at Holland Marsh for the Department of Horticulture. This building was of frame construction, finished on the inside with plywood, and it required approximately 530 man hours of labour.

Considerable time was required supervising the alterations on the Heber Down farm barn, during the Soil Conservation and Farm Improvement Field Day.

Some 18 different types of experimental poultry equipment and hog self-feeders were developed and constructed for test during the year.

Thirty complete sets of septic tank forms, to comply with the revised Rural Sewage Disposal bulletin, were constructed and distributed to agricultural representatives in the Province. These forms are distributed on request from the agricultural representative's office on a free loan basis.

Plywood construction is being used extensively to simplify design for outdoor as well as indoor use.

Royal Winter Fair Building Ventilation Project

A forced draft thermostatically controlled ventilation system was designed for the large cattle barn of the Royal Winter Fair building in Toronto. Since this barn houses 2,200 head of cattle during the Fair, over 4,000 gallons of water vapour must be removed per day from the building. Twelve propeller fans with an individual capacity of about 12,000 cubic feet per minute were used. Since both beef and dairy cattle were housed in the same building, it was necessary to maintain different temperatures in various sections of the building. This was accomplished by having the fans in the dairy section exhausting, and the fans in the beef section forcing, air into the building. The system operated quite successfully, maintaining temperatures in the beef section from 45-51° F. and in the dairy section from 55-63° F. Relative humidity was maintained at about 73 per cent during the entire period. Because of the operation of the ventilation system odors in the exhibit area in other sections of the arena were very much reduced.

Drainage Division

The usual drainage assistance of making surveys, preparing plans and profiles for installation purposes, making inspections of work installed, preliminary surveys, and advisory visits, was extended to the farmers during the 1949 season. Some 898 farmers in all were given assistance in one form or another. Aside from the permanent men on survey work, two summer assistants were used from the College and two from Kemptville Agriculture School. A total of 357 surveys was made, and on 270 of these, work has been started or completed. The tile situation, although still far from adequate, has improved

greatly during the year. The total number of ditching machines that reported operating during the year was 141, of which 23 are new models, imported in the last few years. These include not only the regular tile ditching machines, but the smaller, cheap tile ditcher.

In Eastern Ontario 15 drainage field days were held. The attendance varied from 100 to 2,500. All types of drainage machinery were demonstrated.

A Drainage Short Course for machine operators was held in January at which there was a regular attendance of 18.

Drainage debentures issued under the Tile Drainage Act amounted to $258,700. This is an increase of $8,000 over last year.

Summary:

No. of farmers given assistance	898
No. of acres surveyed	7,665
No. of feet of profile prepared	666,801
No. of preliminary surveys	219
No. of inspections made	69
No. of advisory visits	322

Some 5,627 blueprints were produced through the blueprinting service of the Department.

C. G. E. DOWNING,

Head of Department.

DEPARTMENT OF ANIMAL HUSBANDRY

The fiscal year, 1949-50, presented many unusual and uncontrollable problems with respect to the maintenance of the live stock under the direction and supervision of the Department of Animal Husbandry staff. The rainfall during the summer season was far below average, with the result that the pastures, even the improved pastures, were short, and the yields of forage crops, hay and grains, were, on the basis of the average of the years 1943-48 inclusive, short the following quantities:

Hay	386 tons
Oats and Mixed Grain	41.5 tons
Barley	8.9 tons
Wheat	18.9 tons

As a result of this shortage of feed, it became necessary to dispose of considerable breeding stock, old and young, that otherwise would not have been offered for sale, and to curtail experimental feeding projects, especially with respect to those where roughage was involved.

During the year, the actual purchases consisted of 1 Holstein bull, 1 Hereford heifer, 2 Yorkshire boars, 8 experimental hogs, 7 breeding ewes, and 105 Western lambs for an experimental project.

The sales consisted of 9 horses, one of which was sold to the United States for $1,000, and the remainder as commercial horses; 48 beef cattle, 19 of which were sold for breeding purposes; 65 dairy cattle, 37 of which were sold for breeding purposes; 185 sheep, 27 for breeding purposes; and 290 swine, 33 for breeding purposes.

A considerable volume of this live stock had, in the opinion of the staff, partially satisfied its purposes for both classroom and experimental use, and, owing to the shortage of feed, was sold.

The Department has had additional physical equipment made available. Last autumn, a new, spacious and modern classroom in connection with the meat Laboratory was made available to the staff where, henceforth, all instruction relative to meats will be given, and opportunity will be afforded to make a detailed study of the carcasses of animals that may have been used in different feeding projects.

Beef Cattle

The results of the third season's grazing in connection with the project previously reported which has to do with the reclamation of marginal land, same to be used for the production of beef, proved to be encouraging, despite the very dry season.

The following is a summary of the three years' results:

Twenty yearling steers grazed the 12 acres in 1947, 12 two-year-olds in 1948, and 16 yearlings in 1949.

	Gain per Acre lbs.	Cost per Acre of Treatment of Pasture $	Net Profit Per Acre $
1947	308	24.65	29.58
1948	219	18.48	68.81*
1949	264	6.14	33.39
Total	791	49.27	131.78

(Rent and interest on investment *not* included.)

* The comparatively large profit per acre in 1948 can be accounted for by the considerable appreciation in the price of beef cattle in the fall of 1948.

Sheep — Crossbreeding

The crossbreeding program was continued. The small flock of ewes used for crossbreeding purposes was augmented by the addition of six Romnelet ewes from Western Canada. One-half of the new flock was bred to a Ryeland ram, and the other half to a North Country Cheviot ram.

Results, experience, and observation to date would indicate that there is a definite place for crossbreeding in the economical and profitable production of commercial lamb in Ontario.

The Value of Corn and Cob Meal in a Ration for Western Feeder Lambs

In October, 105 Western feeder lambs were purchased for feeding trials when corn and cob meal made from hybrid corn grown in the Province made up 40 per cent of the total grain ration. The other 60 per cent of the ration was made up of Ontario oats. The following is a summary of the feeding trial:

Initial weight off car	6,070 lbs.
Shrink per lamb during transit	7.77 lbs.
Per cent shrink	11.5%

FINANCIAL STATEMENT

Cost price, Guelph basis, off car weights	$ 23.87 per cwt.
Cost price, 105 lambs, delivered Guelph, including decking car, freight and feeding costs enroute	1,448.80
Feed Costs:	
18,440 lbs. of hay at an average price of $23.88 per ton	220.17
8,522 lbs. of grain (40% corn and cob meal @ $35.00 per ton, 60% oats @ $50.50 per ton)	188.75
Total feed costs	408.92
Total cost of 105 lambs, freight and feed	$1,857.72
Selling Price:	
105 lambs, 10,380 lbs. @ $26, $27, and $27.50 per cwt. according to grade and prevailing price	$2,800.30
Profit over cost of lambs and feed	$ 942.58
Profit per lamb	$ 8.97

The lambs were graded according to existing carcass standards when 38 graded A, 55 B, 10 C, and 2 D.

From the standpoint of all considerations in so far as the study up to date indicates, it would seem to be desirable to purchase lambs that do not average more than 70 pounds at the commencement of the feeding period, and to plan that they shall be on feed for not less than 13 to 14 weeks. Those lambs on feed for a shorter period of time did not produce as good carcasses, although such lambs did make good gains.

The desirability of taking advantage of the apparent inherent tendencies of the heavier weight lambs to grow should not be ignored. Results indicate that the heavier weight lambs should be fed separately and put on full grain feed as soon as possible.

There is encouraging evidence that, as a result of this one feeding trial, Western feeder lambs, even at the very high initial cost of $23.87 per cwt., can be profitably fed on Ontario grown grains when corn and cob meal is included in the ration.

The Effect of the Addition of Dried Distillers' Solubles On the Palatability of Rations for Brood Sows

Since dried distillers' solubles can be a relatively low cost source of vitamin carriers, but unfortunately are not too palatable, a trial was undertaken to determine the effect of the addition of 2 per cent of dried distillers' solubles to a regular ration, and this ration was checked with a standard one.

The result of the trials was that there was no difference noted in the consumption of the two types of rations, and that this by-product can be fed at the aforementioned level without any undesirable influence on feed intake.

The Supplemental Feeding of Pregnant Sows

This project has been under way since the autumn of 1948. To date, there is definite evidence that there is a considerable difference in the length of time that a sow produces milk in volume; that, in spite of the provision of the very best rations known at the present time, some will not feed their pigs adequately and properly much longer than about four weeks, while there are others that will continue to feed their pigs well until they are weaned.

There is definite indication that an approved ration has an influence on the birth weight of pigs and, to a considerable extent, on the uniformity of pigs born.

The Effect of Additional B. Complex Vitamins on Unthrifty Pigs

Even when weaned at eight weeks of age, many newly weaned pigs fail to gain normally for at least a month after weaning, and in many instances lose weight, become unthrifty; many scour severely and die.

The aforementioned post-weaning set-back, particularly when skim-milk is not available, is being widely reported by commercial hog men.

A project was planned to test the probable effects of additional B vitamins, when groups of unthrifty pigs were provided with five of the B complex vitamins — thiamine, riboflavin, pantothenic acid, niacin, and pyridoxine — at high levels.

To date, only one group has completed the feeding period of 60 days. Ten unthrifty pigs, averaging 23.3 pounds live weight (range 16.7 — 32 pounds), at 94.1 days of age (range 77-104 days) constituted the first group.

At the start of the trial, they were very emaciated, and some were scouring badly. Three, averaging 17.7 pounds at 99 days of age, died within the first two days. Of the remaining seven, six completed the trial. Starting at an average weight of 25.7 pounds at an average age of 94.5 days, they made an average live weight gain of 67.1 pounds in 60 days (range 63.5 — 70.5 days). The pigs changed markedly in appearance, gradually gained in weight, and took on a thrifty, healthy appearance.

This is a progress report.

The Significance of Hay Quality in the Economy of Milk Production

During the year, in co-operation with the Field Husbandry and Animal Nutrition Departments, samples of hay in bale lots as exhibited at different Grassland Field Days and Hay Shows were scored on the basis of such physical qualities as are related to type of mixture, texture, colour, aroma, and freedom from foreign matter.

Samples from these bales were brought to the College where a chemical analysis was made of each. Using the information with respect to scoring and chemical analysis, three lots of approximately one ton each were purchased from exhibitors in the hope that the three lots, when fed to dairy cows, would provide a means of ascertaining further information with respect to palatability and, most important, response to feed in terms of milk produced.

The three samples were fed to seven cows, and a record of the amount of hay fed daily, the amount of hay refused by the cows, (expressed in terms of waste), and the amount of milk produced during that time was made. All other feeds remained constant.

The following table of results as submitted requires but slight elaboration. Results of previous trials indicated a waste up to 33 per cent because of lack of palatability. In this trial, there is significant evidence of a relationship between palatability and milk yield. Attention is called to the variation in nutritional factors as revealed by chemical analysis and also the relationship of same to milk yield.

Sample No.	Wt. of Hay	Prize Won	Score	% Protein	% Calcium	% Phosphorus	% Fibre	% Waste	Lbs. of Milk Produced	Lbs. of Milk Per Day	Lbs. of Milk per lb. of Hay Fed
43	2139	5th	93.25	13.6	1.32	0.261	29.4	1.35	2544	212.0	1.189
6	1849	4th	94.0	16.4	2.05	0.176	33.0	10.3	2046	204.6	1.106
9	1663	*	75.5	9.9	0.831	0.163	36.2	17.07	1765	196.11	1.061

* Placed below tenth.

The Effect of Feed Dilution on Carcass Quality in Swine

In co-operation with the Advanced Registry Board, Dominion Department of Agriculture, wheat bran as a dilutor was added to a finishing hog ration for the purpose of controlling the rate at which pigs will take on market finish. The project involved the two systems of feeding — hand and self feeding.

The following results of the one trial indicate the effect of diluted rations on carcass quality when the Record of Performance method of scoring bacon hog carcasses was used:

		Carcass Score
Hand Fed	—Regular Ration	74
	Diluted Ration	82
Self Fed	—Regular Ration	74
	Diluted Ration	69

This trial is being repeated when winter farrowed pigs will be used instead of spring farrowed pigs which were used in the first trial.

Dairy Cattle Nutrition

Under the direction of the personnel of the Department, in co-operation with officials at other institutions and the Federal Department of Agriculture, a compilation was made of all of the work, and results of same relative to dairy cattle nutrition (research and experimentation) in Canada and has been abstracted.

In the very near future, this information will be made available to those bodies or individuals who may be interested in dairy cattle nutrition investigational work or the application of same.

Health

The Department continues to co-operate with the Ontario Veterinary College when animals from all divisions are made available to the aforementioned Institution for investigational and educational purposes upon request.

Breeding Programs

In co-operation with the Federal Department of Agriculture, during the season of 1949, two imported stallions, Craigie Diplomat (Clydesdale), and Panatomic (Irish Thoroughbred), stood for service at the College for the use of the farmers of this district.

Thirty-seven mares were bred to Panatomic and sixty-three mares were bred to Craigie Diplomat.

During the summer months, an experiment was carried out in Dufferin County to compare the conception rate obtained through the artificial insemination of beef type females with that obtained by artificial insemination of dairy type females. An analysis of the results of some 200 inseminations showed no significant difference between the conception rate obtained with the beef cattle and that obtained with the dairy cattle in that area.

As a result of this trial, four Shorthorn bulls of College breeding, the result of the breeding project that has previously been reported, along with a bull bred by another breeder, but of the same breeding on the sire's side, have been recently placed at the Maple Artificial Insemination centre.

The policy of providing semen from sires at the College for the use of owners of small purebred herds was continued during the year.

Field Service

The personnel of the staff continues to comply with requests to participate in the program of field days, barn meetings, etc., and to act in the capacity of judges at several of the major shows.

Herd Classification

One of the most important fields of activity with respect to extension service continues to be the participation in dairy herd classification work. Members of this department have been pioneers in herd classification policies, and progressively the call for direction and leadership increases from year to year. During the past year, 69 farms were visited, and 1,100 dairy cattle were classified by members of the Animal Husbandry staff. This activity is not only a service to our dairy cattle breeders, but also provides a considerable amount of valuable information which can be used advantageously in the classroom.

R. G. KNOX,

Head of Department.

DEPARTMENT OF ANIMAL NUTRITION

Use of Commercial Animal Protein Factor Supplements in Poultry Rations

Growth Studies — Six per cent fish meal in a practical type chick starter containing soybean oil meal and cereal grains was progressively replaced with an animal protein factor supplement (APF supplement No. 3 supplied by Merck and Co. Ltd.). The weights of the birds at 8 weeks, maintained from one day old on wire screen floors, suggested a growth factor or factors in fish meal not supplied in adequate amounts by the APF supplement at a level of 0.11 per cent of the diet. The addition of 0.2 per cent methionine to the diet containing APF supplement, but no fish meal was ineffective. The further addition of 5 per cent dried whey improved growth, and it would appear that such a diet was capable of giving as good as, or superior growth to, that given by a diet containing 6 per cent of the fish meal. All supplemented diets in this experiment were superior to a negative control diet containing soybean oil meal as the sole protein supplement. Since the APF supplement used in this experiment was a rich source of vitamin B_{12} it is likely that the growth promoting which was observed could be attributed largely to this vitamin.

A comparison was made of 3 commercial APF supplements, APF supplement No. 3 (Merck), APF supplement — 5 (Lederle) and Bi-Con APF — 6 (Pfizer) each at a level of 0.5 per cent in a practical type chick starter containing soybean oil meal. Average weights at 4 weeks for the three diets were respectively 265, 295, 290 grams.

For the latter two supplements these weights were superior to that given by a diet containing 6 per cent fish meal. All APF supplements gave growth superior to that given by a negative control diet containing soybean oil meal as the sole protein supplement.

Hatchability Studies — This work was carried out with the co-operation of the Department of Poultry Husbandry. Observations were made on the hatchability of eggs obtained from 3 groups of hens raised and maintained from day old on wire floors, and fed diets containing as supplements to the basal diet, soybean oil meal plus 6 per cent fish meal, soybean oil meal plus 0.11 per cent APF supplement, and soybean oil meal alone. Percentage hatchability of the fertile eggs set was very low for the group fed soybean oil meal as the only supplement. The embryo mortality peak for this diet occurred at 10-14 days, and the dead embryos were characterized by underdeveloped legs and feet and a shortened and swollen condition of the head, particularly about the eyes.

Value of Homogenized Condensed Fish in Poultry Rations

Feeding trials were conducted to test the replacement value of Homogenized Condensed Fish for fish meal in a practical type chick starter containing soybean oil meal. Homogenized Condensed Fish is a commercial product containing approximately 50 per cent solids and made by the digestion of trash fish, mostly cod and haddock trimmings. Under the conditions of this experiment, the Homogenized Condensed Fish was not a satisfactory substitute for 6 per cent fish meal in the diet when used at levels varying from 3 to 8 per cent on a wet basis. The addition of 5 per cent dried whey to a diet containing 6 per cent Homogenized Fish improved growth, but this supplemented diet was still inferior to that containing 6 per cent fish meal.

Microbiological Assays for Amino Acids

The organisms Lactobacillus arabinosus 17-5, Streptococcus faecalis, and Leuconostoc mesenteroides P-60 are being used for assay purposes. These assay methods are serving as an analytical tool in various departmental research problems.

Studies on the Heat Treatment of Proteins

Excessive heat treatment during processing of many protein supplements used in animal and poultry feeds is known to lower their nutritive value. Investigations are under way on the effects of heat treatment under various conditions. The protein of sunflower seed oil meal is under investigation at the present time since recent work in this department has shown that commercial sunflower seed oil meal may be seriously deficient in the amino acid lysine. Influence of heat on the rate of enzymatic digestion of the protein and on the destruction or inactivation of lysine and methionine are being considered. The work will be extended to other proteins.

Nutritional Studies with Swine

Work was started on an investigation of the nutritional requirements for successful reproduction. In a co-operative project with the Ontario Veterinary College, sows were maintained during the first five weeks of pregnancy on purified diets extremely low in riboflavin, but complete in other vitamins known to be required. Comparison with litter mates fed the same diets supplemented with riboflavin indicated no unfavourable effects from the deficiency. Appetite was maintained, the young sows continued to grow, litter size was not influenced, and no abnormalities were observed in the young at birth which could be attributed to the deficient diet. Investigations are continuing on the possible effects resulting from longer periods of dietary riboflavin deficiency.

Determination of Riboflavin

Routine riboflavin assays were conducted on request on feed preparations and experimental rations as well as excretory products of animals on experiment.

Determination of Niacin

Various methods of analysis for niacin as reported in the literature were investigated. One considered most satisfactory was chosen for future assay work on the niacin content of corn samples differing genetically and grown on different soils.

Determination of Pantothenic Acid

Extensive investigational work was carried out in an attempt to establish a suitable medium for the assay of pantothenic acid using Lactobacillus arabinosus —17. It was observed that in addition to its buffering effect, sodium acetate appeared to act as a metabolite for this organism. Sodium citrate was added to the medium in addition to the sodium acetate to increase the buffering effect. When tween 80, a sodium monoethyloleate, was added to the medium, an enhancement of growth was observed. Since it was felt that fatty acids would be natural constituents of aqueous extracts of natural food stuffs, it was considered advisable to add tween 80 to the basal medium to make it more complete. A need for a delicate balance of ingredients in the basal medium has been found necessary, and

work is progressing in an attempt to develop the most suitable basal medium for assay purposes.

In this connection, methods of enzymatic extraction of the pantothenic acid are being compared with aqueous extraction methods. It is planned to use the pantothenic assay method to compare the pantothenic acid content of genetically different varieties of corn grown on varying field plots under differing climatic conditions.

Determination of Folic Acid

The Department participated in the A.O.A.C. collaborative study of microbiological assay methods for folic acid. This study involved a comparison of microbiological assays for folic acid in three natural products, a liver concentrate and a solution of folic acid using two organisms, Lactobacillus casei and Streptococcus faecalis.

Results obtained compared very favourably with those reported from 17 other participating laboratories in the United States and in Canada.

Determination of Choline

Considerable drift in the percentage recovery of pure choline from prepared solutions was observed, using the existing method of analysis with Neurospora crassa as the test micro-organism. Modifications of the basal medium were made in an attempt to minimize this drift. By doubling the concentration of sucrose and using a freshly prepared biotin solution, this drift was completely eliminated giving equivalent recoveries of choline over a range of from 1 to 20 micrograms. Experimental rations were assayed for choline on request. Methods of preparation of sample extracts are being investigated to facilitate the assay of feeds very low in choline content.

Determination of Thiamine

Satisfactory assay results could not be obtained using the recommended fermentation method. Studies were carried out modifying the basal medium in an attempt to obtain greater consistency in replicate determinations. It was observed that the *p*H of the fermentation mixture after the three hour incubation period varied from day to day and also between replicates. By increasing the amount of phosphate buffer and adjusting the reaction mixture potentiometrically to a *p*H of 5.4, the existing discrepancies were overcome.

Nutrient Content of Ice Cream

This co-operative project with the Ontario Association of Ice Cream Manufacturers involves an investigation of the thiamine, riboflavin, vitamin A activity, protein and total carbohydrate content of ice cream. No established method was available for the quantitative assay for total carbohydrates. A relatively satisfactory procedure has been developed for the determination of this fraction. A value for the carbohydrate fraction is obtained by subtracting from 100 the percentage ash, lipid material, and protein.

Carotene Studies

Determination—A great deal of difficulty has been encountered by commercial laboratories in obtaining agreement on the determination of carotene (provitamins A) in dehydrated forages. Recently, attention has been focussed on the rapid chromatographic procedure.

This procedure has been exhaustively studied over the past two years to locate its chief sources of error, and to set up a uniform procedure by which carotene may be accurately determined in various laboratories.

Four saturated hydrocarbon solvents—hexane, heptane, skellysolve B and skellysolve C were compared for their efficiencies in extracting carotene at room temperature and at reflux temperatures. The most suitable method was found to be treatment of the sample at room temperature in the dark for 18 hours with a small quantity of skellysolve C or heptane containing four per cent of acetone.

Fifteen adsorbent materials were investigated for their efficiencies in separating pure carotene from the complex pigment mixtures of the extract. A mixture of one part by weight of Micron Mg0 #2641 to three parts of Hyflo Super-Cel was selected since, of three materials giving complete separation, it was the only one with which the extracting solvent mentioned above could be used as the developing solvent.

The estimation of carotene concentration in the chromatographic eluate was studied. Differences in the absorption curves of carotene in various solvents were demonstrated, and the use of a quantitative photometric constant for calculating the concentration from the absorbancy of the solution was shown to be inaccurate. A method was adopted of setting up concentration-absorbancy or transmittancy curves for carotene solutions in specific solvents for several photoelectric photometric instruments.

Commercial carotene (90 per cent Beta—10 per cent Alpha) was shown to be a suitable standard against which to compare the natural carotene extracted from forage samples.

The complete method of carotene determination adopted was shown to be simpler and equally as accurate as the A.O.A.C. Official Method. In a collaborative study with seven other laboratories, further sources of error were revealed, and means of overcoming these errors have been devised.

A rapid and relatively accurate method for preparing fresh forage for carotene determination was developed. In this method, the fresh material is first rapidly dehydrated at low temperature in a vacuum oven. The carotene determination is then carried out as for a sample of dehydrated material.

Preservation of Carotene in Dehydrated Forages During Storage—Various types of moisture-proof and permeable bags were used, and facilities for storage under fixed conditions of temperature and humidity were constructed and used. Storage under normal variant conditions was also studied.

The results of all experiments indicated that, regardless of storage conditions, it is advisable to increase the moisture content of the material to the limit at which spoilage can be prevented. The mechanism of carotene preservation is probably an increased acidity because of residual respiration of the plant cells when their moisture content increases.

The storage of low-moisture meals in moisture-proof bags was shown to be inadvisable. On the other hand, if the moisture content of the meal were from 12 to 15 per cent, storage in such containers would probably lead to increased retention of the carotene.

These studies are being continued.

Effect of Fluorine in Mineral Supplements on Growth and Bone Formation in Chicks

This project was undertaken to establish the symptoms and mechanism of toxicity as well as the safe levels of fluorine which can be used in chick rations. There is considerable variation in the fluorine content of mineral supplements such as a rock phosphate after they have been defluorinated, and there is a great deal of discrepancy in the official recommendations and regulations regarding the amount of fluorine which is safe for poultry.

Preliminary investigations have shown that fluorine produces a marked depressing effect on the ash content and an increase in the phosphatase activity of the plasma, bone and liver tissue with no effect on the phosphatase of kidney and intestinal mucosa. The effect on the bone ash appears to be a transient one and warrants further investigation.

Vitamin D Assays

During the year six commercial samples of cod liver oil were assayed for vitamin D and a charge was made for this service.

Nutrient Content of Forage Crops

Collaborative studies on the nutrient content of forage crops with the Department of Field Husbandry were continued in 1949. The crude protein, calcium, and phosphorus content of pasture mixtures as influenced by manure and fertilizer was determined. Approximately 300 samples which were collected during the seasons 1946 and 1947 were analysed.

During the year samples collected in strain tests conducted in Waterloo and Haldimand Counties by the Department of Field Husbandry during the period 1944-1946 were analysed for crude protein, calcium, and phosphorus. A total of 400 samples was analysed in these studies.

Studies on the Nutritive Value of Hay

In a co-operative project with the Department of Animal Husbandry, a study was made on the crude protein, crude fibre, calcium, and phosphorus content of 67 samples of hay graded by judges at Grassland Days in several counties. Correspondence between the grades given by judges and the nutrient content determined by chemical analysis was good within the different class of forage.

Phosphatase

In co-operation with the Ontario Veterinary College, a study was made on the phosphatase content of the plasma of normal and deformed pigs at birth. No abnormalities in the level phosphatase activities were found.

Further studies were made in the kinetics of the phosphatase of normal and rachitic chicks with particular reference to the influence of amino acids on the enzyme activity.

The influence of manganese, calcium, and phosphorus on bone and plasma phosphatase of chicks was investigated in a series of co-operative studies with the Department of Poultry Husbandry in the interrelationship of manganese and other minerals and vitamins in growing chicks.

Calcium Content of Milk

A study was commenced on the calcium content of milk in co-operation with the Department of Animal Husbandry. Weekly samples of milk from the important breeds of the College herd throughout the lactation period will be analysed for calcium. In addition, samples of milk will be procured from a commercial dairy in this city.

Interrelationship of Manganese and other Nutrients in Poultry

In co-operation with the Department of Poultry Husbandry, a study was initiated of the interrelationships of manganese, phosphorus, and several vitamins, with regard to their effect on calcification of bone and the activity of the enzyme phosphatase in the plasma and various tissues of chicks. These studies are closely integrated in the investigations which have been made on the utilization of various forms of phosphorus.

Cobalt Content of Forage Crops

A completely satisfactory analytical method for forage crops is not available, and a project was undertaken in which several methods are being investigated relative to their adaptability for the determination of the small amounts of cobalt present in forage crops. Some modifications of these methods are being tested with the objective of improving the procedure prior to making a survey of the cobalt content of forage crops in Ontario.

Published Papers

1. Pelleted and unpelleted diets high in dehydrated green feeds for turkeys grown in confinement. S. J. Slinger, K. M. Gartley, and E. V. Evans. Poultry Science 28:556-561, 1949.

2. Soybean oil meal and sunflower seed oil meal in rations for Broad-Breasted Bronze Turkeys. S. J. Slinger, D. C. Hill, K. M. Gartley, and H. D. Branion. Poultry Science 28:534-540, 1949.

3. Further observations on the use of sunflower seed oil meal in turkey starter rations. K. M. Gartley, S. J. Slinger, and D. C. Hill. Poultry Science 29:312-313, 1950.

4. Ice Cream in the field of nutrition. H. D. Branion. Canadian Dairy and Ice Cream Journal 29:39-41, 90. 1949.

H. D. BRANION,

Head of Department.

DEPARTMENT OF APICULTURE

Special Services and Extension

The choice of suitable locations for bee yards is becoming a problem. Lists of beekeepers' locations are provided for the agricultural representative of each district so that new locations may be chosen without too much crowding.

Considerable time has been spent on the preparation of a much needed bulletin "Beekeeping in Ontario", which will likely be completed in 1950.

Approximately 30 beekeepers' meetings were arranged in co-operation with the Ontario Beekeepers' Association, and representatives were present from this department. Periodic News Bulletins with up-to-date information were forwarded to all beekeepers. Several hundred disease samples were diagnosed, and many samples of honey graded.

Periodically Nosema disease shows up and causes unexpected losses to beekeepers. In an effort to learn a little more about when or why this disease strikes a survey was made of the College apiaries. Of a number of diseased colonies discovered only one actually died from Nosema.

Inoculation studies with caged bees were carried out, and much material was obtained for further microscopic examination of the life cycle of this parasite.

Stock Selection (Project No. AP. 1)

During the 1948-49 season 60 queens were on test for possible selection as breeders for Pelee Island. Records were taken on honey production, spring brood rearing, and on flight activity and longevity of the worker bees. Of all queens tested, hybrids showed the greatest promise, and steps have been taken to procure hybrid breeders to augment our regular stock.

A high degree of correlation was found to exist between the measurements of certain wing veins and the dry body weights of queen bees. Experiments are under way to determine whether this factor is tied in with honey production, and could be used in the selection of breeder queens.

Artificial Insemination

Preliminary experiments were conducted to determine the correct manipulation of the apparatus used for artificial insemination, and several successful matings were procured.

Production

Approximately, 2,500 queens from selected stock were produced and distributed from Pelee Island during the 1949 season.

Queen Overwintering

In the fall a large surplus of Pelee queens is always on hand. An effort was made to overwinter about 300 queens in incubator cabinets. Unfortunately, Nosema disease was contracted in the incubator cages, and a large number of queens were lost. However, some queens were wintered and have been successfully introduced to honeybee colonies.

Fall Requeening

Several groups of colonies were requeened during the late summer and fall in an effort to determine whether there was any advantage in late fall requeening. Results of this experiment will not be known until observations on spring brood rearing are made.

Pollination (Project AP. 2) (Legume Research Committee)

Suitable methods for counting bee populations on both row and broadcast stands of legume crops have been developed. Counts taken on alsike and red clover, as well as on white dutch, and sweet clover, confirmed the fact that honeybees are primarily responsible for the pollination of these crops.

The rate of activity of honeybees was found to vary considerably on the different clovers and appeared to act as an index of their order of preference for the clover. On sweet clover, where the highest honeybee population was found, the average number of florets visited per minute was 42.5, while on red clover, where honeybee populations were considerably lower, only nine florets were visited per minute. Alsike, white dutch, and alfalfa, in order of decreasing honeybee activity, were intermediate between the above extremes.

Of the various environmental factors studied, temperature range and maximum temperature appear to exhibit the greatest effect on both nectar concentration and pollinator populations. Other correlations were not in complete accordance with previous figures, possibly because of the extremely abnormal weather conditions prevailing during the 1949 season.

A suitable method for marking foraging bees at the hive entrance, using the compound fluorescein, was devised.

D.D.T. as applied to alsike clover plots was apparently non-toxic to foraging bees, and appeared to increase the amount of bloom and the honeybee population on test plots.

Determination of a More Rapid and Cheaper Method for Determining Moisture Content of Honey (Project No. AP. 3)

The present equipment for determining moisture content and subsequent grade of honey is too slow of operation and too expensive. Work has been started on developing better means for this purpose. Several hundred honey samples have been secured from three different provinces for comparative studies, and test apparatus has been devised for preliminary investigations.

Apiary Inspection and Disease Control

During the 1949 season some 90 Apiary Inspectors operated under the supervision of the Provincial Apiarists Office. The apiary registration totalled 202,898 colonies, operated by 4,875 beekeepers. Of these colonies, 55,689 were inspected in 3,385 apiaries. American Foulbrood infection was found in 5.4 per cent of the colonies inspected.

More than 500 moving or selling certificates were issued during the season.

Detailed reports of the Apiary Inspection and Honey Production by Counties for the 1949 season follow:

COUNTY	1949 INSPECTION						REGISTRATION	
	APIARIES			COLONIES				
	Insp.	Dis.	% A.F.B.	Insp.	Dis.	% A.F.B.	Apiaries	Colonies
Algoma	----	----	----	----	----	----	19	188
Brant	23	2	8.6	586	6	1.1	111	3,270
Bruce	58	14	24.1	1,362	86	6.3	53	9,243
Carleton	102	10	9.8	2,625	31	1.1	231	5,980
Cochrane	45	0	0.0	563	0	0.0	42	486
Dufferin	36	1	2.7	680	2	0.3	75	2,249
Dundas	2	0	0.0	41	0	0.0	55	1,199
Durham	52	3	5.7	909	3	0.3	109	3,061
Elgin	54	4	7.4	635	5	0.8	169	4,344
Essex	92	23	25.0	698	97	13.8	220	3,382
Frontenac	2	0	0.0	45	0	0.0	75	2,260
Glengarry	11	1	9.1	240	30	12.5	81	3,260
Grenville	9	4	44.4	249	10	4.0	86	1,652
Grey	51	7	13.7	771	24	3.1	259	10,631
Haldimand	80	30	37.5	2,933	701	23.9	190	5,813
Haliburton	10	2	20.0	51	5	9.8	11	99
Halton	14	0	0.0	85	0	0.0	141	5,116
Hastings	101	9	8.9	2,695	43	1.5	218	8,317
Huron	96	10	10.4	3,334	52	1.5	253	8,379
Kenora	----	----	----	----	----	----	22	112
Kent	176	22	12.5	1,459	53	3.6	170	3,186
Lambton	160	37	23.1	2,208	196	8.8	300	9,158
Lanark	34	3	8.8	536	4	0.7	111	3,415
Leeds	26	2	7.6	483	8	1.6	89	2,892
Lennox & Addington	29	0	0.0	270	6	2.2	100	3,140
Lincoln	136	15	11.0	1,677	78	4.6	173	2,855
Manitoulin	----	----	----	----	----	----	23	240
Middlesex	100	12	12.0	1,736	73	4.2	245	8,702
Muskoka	10	7	70.0	114	35	30.7	35	392
Nipissing	----	----	----	----	----	----	20	159
Norfolk	66	20	30.3	851	155	18.2	134	1,893
Northumberland	185	14	7.5	2,734	33	1.2	193	4,696
Ontario	138	22	15.9	2,034	76	3.7	108	5,383
Oxford	133	13	9.7	2,018	32	1.5	153	4,241
Parry Sound	----	----	----	----	----	----	52	846
Patricia	----	----	----	----	----	----	1	1
Peel	69	12	17.3	1,215	78	6.4	193	6,197
Perth	21	3	14.2	735	10	1.3	138	5,301
Peterboro	72	1	1.3	1,125	4	0.3	112	3,289
Prescott	40	0	0.0	1,321	0	0.0	69	3,475
Prince Edward	33	4	12.1	535	199	37.1	79	1,838
Rainy River	18	0	0.0	90	0	0.0	81	938
Renfrew	81	15	18.5	810	231	28.5	139	4,003
Russell	40	1	2.5	613	3	0.4	63	1,759
Simcoe	109	11	10.1	2,400	34	1.4	321	10,360
Stormont	47	5	10.6	1,607	9	0.5	90	2,897
Sudbury	----	----	----	----	----	----	3	38
Thunder Bay	37	0	0.0	126	----	0.0	33	131
Timiskaming	36	8	22.2	869	31	3.5	56	1,226
Victoria	77	5	6.4	1,006	8	0.7	118	3,595
Waterloo	89	11	12.3	1,299	25	1.9	167	4,000
Welland	98	27	27.5	1,131	267	23.6	166	2,730
Wellington	110	15	13.6	2,133	35	1.6	108	7,718
Wentworth	129	11	8.5	1,041	30	2.8	188	4,396
York	248	56	22.5	3,011	227	7.5	452	8,767
Total	3,385	472		55,689	3,035		6,903	202,898
Average			13.9			5.4		

ONTARIO HONEY CROP REPORT, 1949

COUNTY	Colonies in Thousands	Light per Colony	Light Production in Lbs. By County	Dark per Colony	Dark Production in Lbs. By County
Algoma	0.0	25	----	05	----
Brant	3.5	05	17,500	30	105,000
Bruce	9.0	30	270,000	25	225,000
Carleton	6.0	80	480,000	10	60,000
Cochrane	0.5	65	32,500	15	7,500
Dufferin	2.5	----	----	25	62,500
Dundas	1.0	10	10,000	45	45,000
Durham	3.0	----	----	10	30,000
Elgin	4.5	30	135,000	20	90,000
Essex	3.5	35	122,500	10	35,000
Frontenac	2.5	35	87,500	05	12,500
Glengarry	3.5	30	105,000	45	157,500
Grenville	1.5	15	22,500	50	75,000
Grey	10.5	55	577,500	25	262,500
Haldimand	6.0	100	600,000	10	60,000
Haliburton	0.0	----	----	----	----
Halton	5.0	10	50,000	10	50,000
Hastings	8.5	45	382,500	10	85,000
Huron	8.5	30	255,000	35	297,500
Kenora	0.0	----	----	15	----
Kent	3.0	35	105,000	45	135,000
Lambton	9.0	55	495,000	15	135,000
Lanark	3.5	65	227,500	----	----
Leeds	3.0	40	120,000	10	30,000
Lennox & Addington	3.0	25	75,000	05	15,000
Lincoln	3.0	10	30,000	15	45,000
Manitoulin	0.0	40	----	----	
Middlesex	8.5	20	170,000	15	127,500
Muskoka	0.5	40	20,000	10	5,000
Nipissing	0.0	45	----	10	----
Norfolk	2.0	35	70,000	50	100,000
Northumberland	4.5	20	90,000	05	22,500
Ontario	5.5	20	110,000	10	55,000
Oxford	4.0	10	40,000	45	180,000
Parry Sound	1.0	35	35,000	----	----
Peel	6.0	10	60,000	05	30,000
Perth	5.5	60	330,000	20	110,000
Peterborough	3.5	30	105,000	05	17,500
Prescott	3.5	20	70,000	10	35,000
Prince Edward	2.0	----	----	----	----
Rainy River	1.0	85	85,000	15	15,000
Renfrew	4.0	60	240,000	10	40,000
Russell	2.0	40	80,000	15	30,000
Simcoe	10.5	25	262,500	05	52,500
Stormont	3.0	30	90,000	10	30,000
Sudbury	0.0	----	----	----	----
Thunder Bay	0.0	65	----	10	----
Timiskaming	1.0	100	100,000	15	15,000
Victoria	3.5	40	140,000	10	35,000
Waterloo	4.0	30	120,000	20	80,000
Welland	2.5	05	12,500	25	62,500
Wellington	7.5	60	450,000	25	187,500
Wentworth	4.5	50	225,000	15	67,500
York	9.0	10	90,000	10	90,000
Average		35		17	
Totals	203.0		7,195,000		3,407,500

DEPARTMENT OF BACTERIOLOGY

Services

Four hundred and eighty-six samples of farm and school well water were analysed. Two hundred plant, food, milk, and miscellaneous samples were submitted for examination. One hundred and seventy-three bovine samples of blood from the College herd were tested for Bang's disease. Three hundred and thirty-one lactic starters were sold to dairies and cheesemakers, and 8,972 legume cultures were prepared and forwarded to farmers, seedsmen, and agricultural representatives.

Pullorum Disease Control

The numbers of fowl tested by the tube agglutination method for pullorum disease control totalled 162,657, of which 35,831 were turkeys. A total of 470,700 ml. of antigen was prepared and used for testing and distribution to other laboratories. Sixty-eight fowl which gave suspicious reactions during routine testing were submitted for post mortem and cultural examination. Nineteen of these fowl were found to harbor *S. pullorum.* Efficiency of fumigation in various hatcheries in Ontario was checked by bacteriological examination of fluff samples and by visits to certain plants. Operators conducting the rapid test for the Department of Poultry were instructed in the technique of the test and were supervised from time to time in the field.

Pullorum Antigen Studies

Studies have been continued to develop a suitable single test pullorum antigen to replace the double test used during the past few years. After considerable experimentation, an antigen has been developed and suitably tested. This antigen incorporates characteristics of both variant and standard strains of *S. pullorum.* The antigen was officially adopted for use throughout the Dominion, and this department supplied various provinces with antigen during the past year. Examination of *S. pullorum* cultures from the various laboratories throughout the Dominion was continued, 168 cultures being serologically typed. Assistance in culture typing also was given to laboratories in Yugoslavia, Denmark, Sweden, South Africa, South America, and Great Britain.

Non-Pullorum Reactions

Investigations into the possibility of dietary factors influencing the production of non-pullorum reactions in the agglutination test for pullorum disease were continued. Spoiled protein supplement in the form of fish meal was fed to both baby chicks and adult fowl. Post mortem and cultural examinations were conducted at periodic intervals to determine toxic and other effects. It was determined that spoiled fish meal had no toxic effect, nor were there any intestinal disorders. The feeding of this material did not initiate the production of non-pullorum reactions, and it appears doubtful that the problem is related to the feeding of such products to fowl. It also was determined that feeds sprayed with a putrefactive anaerobic organism resulted in increased growth of chicks over controls.

Insect Microbiology

Black Rot of Turnips —As the result of a request from the turnip growers, investigations were conducted on the importance of aphids and cabbage worms in disseminating the causal organism of Black Rot of turnips. After extensive

investigations it was determined that while a certain number of these insects were able to carry the causal organism, both internally and externally, they were unable to induce the disease in healthy turnips, after feeding on diseased tissues, feeding on cultures of the organisms, or after being artificially contaminated with the causal organism.

Bacterial Flora of the Hemlock Looper — In co-operation with the Forest Insect Laboratory, Sault Ste. Marie, where studies on certain bacteria associated with forest insects are being carried out, a project was conducted to determine the normal bacterial flora of the hemlock looper. It was found, after a study of all the life stages of the insect, that there was no dominant bacterial flora, and that many species of yeasts and bacteria were mainly soil types ingested with the food of the insect.

Legume Research

Indications that strains of root nodule bacteria may become inefficient or even parasitic, thus affecting legume plant growth, prompted preliminary studies on this aspect of legume research. Employing a new method whereby nitrogen fixation in legumes is measured by determining the amount of leghaemoglobin in nodules, it was found that efficient nodulation was more pronounced in certain legumes than others, and that there were indications that some strains of root nodule bacteria were inefficient. These studies are being continued on a larger scale.

Potato Scab Research

As part of the general project on potato scab, it was deemed essential that studies should be conducted on methods of differentiating between parasitic and saprophytic forms of *Streptomyces scabies*. Various biochemical and cultural tests were employed for this purpose, and, after extensive inoculations involving thousands of transfers, it was determined that none of the tests showed any value in this respect. Consequently, serological methods for differentiation of these two types are being investigated. To date, the results on serological relationships are inconclusive and the work is being continued.

Soil Microbiology

In co-operation with the Vineland Experimental Station, comparative studies on the effect of three methods of orchard management on soil micro-organisms has been continued. These include nitrifying capacity, evolution of CO_2, and decomposition of cellulose. It has been determined that the effect of different managements has been quite pronounced on the activities of certain groups of micro-organisms. Sod plus mulch treatment has favoured the biological activities and soil reaction to a much greater extent than other treatments.

The Lees and Quastel percolation technique has been employed in studies of the various microfloral changes and developments in soil. By this method, the effects and influencing relationships of the nitrifying capacity, the manganese-oxidative capacity and soil reaction on the growth trends and developments of Azotobacter, actinomycetes, fungi, protozoa, and bacterial populations have been studied.

Food Microbiology

Turkey Steaks — In collaboration with the Department of Poultry, investigations were conducted to determine the presence of significant groups of micro-organisms on turkey steaks held at freezing temperatures for varying

periods of time. Bacteriological analysis of frozen steaks showed considerable variation in numbers of bacteria in different groups of steaks stored for various periods of time at —10°F. However, it was determined that a holding temperature of —10°F. up to 13 months brought about a marked reduction in bacterial populations. Coliform bacteria were found in most steaks prepared from eviscerated birds, but they died out relatively quickly at —10°F. Frozen and fresh steaks stored under household refrigerator temperatures showed increasingly high bacterial counts.

Evisceration of Broilers — Preliminary investigations were begun on a bacteriological comparison of wet and dry methods of evisceration of broilers. High counts of coliform and proteolytic bacteria obtained indicated certain weaknesses in both methods. Using the dry method, it was shown that cutting into a part of the intestine resulted in heavy contamination, while with the wet method, washing tanks, equipment, etc., were a problem unless large amounts of running water were available.

Mayonnaise Spoilage — a problem of mayonnaise spoilage submitted by a Canadian food manufacturer prompted an investigation into the cause of the spoilage. Organisms belonging to the genus *Lactobacillus* were isolated and proved to be the cause of the spoilage. Low bacterial count ingredients were found to be essential in such a product where high temperature processing cannot be employed. Also, defects in equipment contributed to the cause of the spoilage.

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5. Howitt, J. E., Sands, D. R., and Garrard, E. H., Diseases of Vegetables. Bull. 386, 1949.

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E. H. GARRARD,

Head of Department.

DEPARTMENT OF BOTANY

Teaching

Courses for students in the Botany Option were redesigned to provide adequate training for subsequent post-graduate study in specialized fields. Opportunities for the Botany Option graduate as well as service to agriculture were taken into consideration.

Extension Services

Practically all the County Fruit Growers' meetings in regard to Orchard Spray Service were attended in addition to several other meetings on disease and weed control. The Late Blight Warning Service was organized to give timely advice, through press and radio, for the control of Late Blight on potatoes and tomatoes. Considerable time was devoted to the revision of bulletins, circulars, and spray and protection calendars.

Chemical Weed Control

Research projects in chemical weed control were interrupted in 1949 by the untimely death of Professor W. M. Gammon. Although certain of the projects initiated in the spring were discontinued, most of the field work was carried through to completion.

Field results during 1949 were markedly affected by two prolonged periods of mid-summer drought. In a number of projects this dry weather so obscured the effect of the treatment that no definite conclusions could be made, and results reported herein must be considered in the light of these adverse conditions.

Persistent Perennial Weeds (Project Bo 15 Weed I) — Investigations indicated that Leafy Spurge is difficult to eradicate with 2,4-D. There was a small survival of this weed on June 20, 1949, in plots which had been treated with 2,4-D of varied formulations and strengths on June 9-10, 1947, retreated on June 2, 1948, and again retreated on May 20, 1949. The ester formulations of 2,4-D at 1,500 and 2,000 p.p.m. were the most effective. Plots established in the spring of 1949 indicated that pentachlorophenol is of little value for the control of this weed.

Field Bindweed is another perennial weed which has proved difficult to eradicate with 2,4-D. The tops of this weed are readily killed by this chemical, but as shown in plot tests during 1948 and 1949, regrowth from the roots can be expected. These particular tests were on Field Bindweed in grass sod.

Some new chemical combinations were tested as late summer applications for the control of Leafy Spurge and Field Bindweed. The results will not be available until the summer of 1950.

Pasture Weeds (Project Bo 16 Weed II) — Plots of Ox-eye Daisy growing in a pasture were treated with selective and non-selective herbicides in the spring of 1949. Dry mid-summer weather made the results of these tests difficult to interpret. Treatments with non-selective herbicides denuded the entire plots and these plots remained bare all summer. This left the areas subject to erosion and emphasized the importance of using selective herbicides on pasture areas.

Certain new chemical combinations were tested as late summer applications for the control of Ox-eye Daisy. The results will not be available until the summer of 1950.

Woody Plants (Project Bo 17 Weed III) — Tests have shown that 2,4-D is an effective herbicide for the species of hawthorns growing in the Guelph district.

For foliage application best results were obtained on the trees sprayed with 2,4-D after the leaves were fully expanded. The full effect of the 2,4-D may not be evident until at least one year after application.

Preliminary investigations indicated that trunk applications of 2,4-D show promise of being one of the most practical means to kill hawthorns. By this technique concentrated 2,4-D is applied as a one-foot band around the lower portion of the trunk. An extensive test was laid down during 1949 to determine the influence of chemical, its formulation and concentration, as well as seasonal time of application on the effectiveness of this type of treatment. In addition chemical banding was tested as a fall application on 20 other species of brush and trees. Results from these tests will not be available until the summer of 1950.

The chemical treatment of hawthorn stumps to prevent regrowth is under investigation. Tests were laid down to determine the effect of chemical, formulation and dosage, and of seasonal time of application on this method of treatment.

Lawn Weeds (Bo 18 Weed IV) — Potassium cyanate gave good promise for the control of Crabgrass in lawns. Although the lawn grass was severely burned by the dosage of chemical used, preliminary tests indicated that adequate control with much less grass damage may be obtained by applying lighter dosages. Phenylmercuric acetate gave adequate control if applied about the time the Crabgrass was germinating and if several treatments were made during the season.

Couch Grass (Project Bo 19 Weed V) — Limited tests made with T.C.A. (trichloroacetate) on Couch Grass at rates of 108, 217, and 435 lb. per acre indicated that while there was excellent control of top growth, there was little injury to rhizomes. When rhizomes were removed from the heavier dosage plots four months after treatment, they showed nearly complete inhibition of above-ground shoots, but there was complete regrowth from these rhizomes when they were placed on chemical-free, moist filter paper. The results so far do not support a recommendation for the use of T.C.A. to eradicate Couch Grass.

Scab Control in Apple Orchards (Project Bo 1 Path I) (Co-operative with Departments of Entomology and Horticulture, O.A.C.)

During 1949 the spray tests in the O.A.C. orchard involved: (a) reduction in the strength of Bordeaux for the delayed dormant and the prepink sprays, (b) the relative merits of Tag (HL 331) as a substitute for, and as a supplement with a microfine sulphur in the prebloom sprays, and (c) the relative merits of Bordeaux, mulsoid sulphur, and a ferric carbamate (Karbam Paste) as the last cover spray for scab control.

Owing to the prolonged, dry summer weather, the scab incidence on check trees was too low for significant correlations on scab control. No fungicidal toxic effects were noted on any of the sprayed trees.

Fusarium Wilt and Late Blight of Tomato (Projects Bo 2 Path II and Bo 3 Path III) (Co-operative with Department of Horticulture, O.A.C.)

Continuing the investigations of 1948, a large number of tomato varieties, selections and crosses were tested under greenhouse conditions for resistance to Fusarium Wilt, and numerous F_1 and F_2 hybrids for resistance to Late Blight. Disease resistant selections are being used in the breeding program by the Department of Horticulture.

Botrytis Corm Rot of Gladiolus (Project Bo 5 Path V)

Anatomical studies indicated that the pathogen, *Botrytis Draytoni,* plays some part in stimulating the development of periderm in diseased corms. Extensive, well-developed periderm was observed surrounding vascular bundles invaded by the pathogen. Such periderm was not observed surrounding bundles which were free of the pathogen.

Anatomical Changes in the Gladiolus Corm in Relation to Maturity and Dormancy (Project Bo 20 Misc. I)

Correlation studies between anatomical changes during the curing process and possible corm resistance to storage diseases indicated that increases in cuticular and periderm thickness were not significant. Variation in stomatal diameter was observed but no correlation with duration of storage was evident. Leaf abscission was initiated after 236 hours of curing but was not uniform at all nodes even on the same corm. Extensive tannin-like bodies accumulated in the corm of Picardy during early stages of curing but their significance was not ascertained. Preliminary investigations indicated that hormone treatment of corms does not influence anatomical changes during the curing process.

Rust- and Wilt-Resistant Fibre Flax (Project Bo 6 Path VI)

A new field area was established at O.A.C. for testing wilt resistance of flax varieties. The inoculum was in the form of soil from the wilt area at the Central Experimental Farm, Ottawa. Even during the first summer, the effect of the wilt organism was very marked.

The summer of 1949 favoured a high incidence of rust and wilt among susceptible varieties. Several good lines of fibre flax were selected having a high degree of rust and wilt resistance. Pasmo, a flax disease relatively new to Ontario, was especially prevalent. Selection for resistance to this disease is in order.

Disease Resistance in Peas and Beans (Project Bo 7 Path VII)

A disease nursery for testing disease resistance of peas and beans was established, and evidence obtained during 1949 suggested the presence of a bean virus, new to Ontario.

Isolates of *Ascochyta pisi,* the cause of Leaf and Pod Spot of peas, were tested under greenhouse conditions for pathogenicity on several varieties of the common pea and on Hairy Vetch. The results indicated the presence of physiologic races.

On the basis of inoculated, detached pods, preliminary investigations indicated that the pea varieties Arthur, Famous, Prussian Blue, and O.A.C. No. 181

are resistant to Bacterial Blight, and that Freezer, Perfection Type J, and Valley are susceptible. Eighty-three other varieties tested expressed an intermediate reaction.

Factors Influencing Seed Yield of Hairy Vetch (Project Bo 10 L.R.C. I) (Legume Research Committee)

The boron requirements of Hairy Vetch were investigated under greenhouse conditions. Boron deficiency inhibited apical vegetative growth and markedly reduced or else entirely prevented flower production.

Pollination techniques in relation to seed yield of Hairy Vetch were investigated. Some seed developed after self-pollination but a much higher seed yield was obtained when cross-pollination was employed, either by hand manipulation or by bees.

Identification of Streptomyces scabies in Potato Tuber Tissue (Project Bo 9 P.S.R. I) (Potato Scab Research Committee)

A method to positively identify the scab organism in tuber tissue is basic to many aspects of the research program.

A new staining technique was developed which will distinctly stain the organism, and cultural preparations were stained for reference in identification of the organism in the potato tuber. Scab lesions, varying in size from minute to well-developed, were sectioned and stained. In material examined to date the organism has been found only within the outer two or three layers of disintegrating cork cells. In no case was the organism found associated with living tuber tissue, and for this reason actual parasitism is still open to question.

The Botanical Herbarium

The reorganization of the herbarium has been completed and conforms to the arrangement commonly used in other herbaria, namely, the Dalla-Torre and Harms system. During 1949, plant collections were added from the West Indies, Yukon Territory, Niagara Glen, and Ottawa vicinity.

J. D. MacLACHLAN,

Head of Department.

DEPARTMENT OF CHEMISTRY

The teaching program of the Department has been expanded during the past year by the following additions: a course in Organic Chemistry for the second year of the Degree Course at Macdonald Institute; a general chemistry course for the first year of the new five-year course at Ontario Veterinary College; a course in Biochemical Preparations for graduate students. Four post-graduate students are at present working in the Department towards an M.S.A. in Agricultural Chemistry.

Mineral Content of Alsike Clover (Legume Research Committee)

During the summer of 1949, material was collected at the Brampton Seed Farm, but owing to the extremely dry weather and consequent lack of growth these samples were not analysed. Analyses of the material collected during the summer of 1948 were continued. Boron and zinc determinations have been carried out. From the results obtained it would not appear that plants from the poor area for seed setting are deficient in either boron or zinc.

Analyses Requested by the Legume Research Committee

One hundred and eighty samples of alsike were analysed for residual DDT. The results showed that considerable DDT residue persisted up to the time of cutting.

Forty samples of vetch were analysed for boron.

Potato Scab Research Committee

Work was continued on the search for an inhibitor of potato scab from decomposing soybean. The extracts prepared were tested against known pathogenic strains of the scab organism. From this work it would appear that no water soluble chemical factor which will inhibit the growth of actinomycetes scabies is formed during the rotting of soybean hay or soybean roots or during the sprouting of soybeans or is excreted from the roots during growth.

Radioactive Tracer Research

Phosphorus Turnover Studies with Tomato Plants — Tomato plants were grown in sand culture in the greenhouse. At an early stage of growth, phosphorus was omitted from the nutrient solution used on some of the plants. The plants were treated with radioactive phosphorus at three development stages. Plants were cut at 1, 3, 6, 24, and 48 hours after exposure to the radioactive material. Methods were adapted for determining triosephosphate, hexosephosphate and hexosemonophosphate, phosphopyruvic acid from the total trichloracetic acid extractable phosphate.

While the results are of a preliminary nature, they indicate that in young, phosphorus-starved plants, approximately 45 per cent of the absorbed phosphorus was still in the extractable form after one hour, while with non-starved plants, 80 per cent of the phosphorus taken up was still extractable in the same time.

Uptake of Phosphorus from Haldimand Clay by Wheat Plants — Radioactive phosphorus in monocalcium phosphate and in a hydroxyapatite were applied to a heavy clay soil and the uptake by wheat plants grown in the green-

house was studied. The results confirm previous findings that monocalcium phosphate is more readily available to wheat plants than is the hydroxyapatite. Mobilization of the plant phosphate into the head as the plant matures was also traced.

Spectrographic Analysis

Methods are being developed for the determination of minor elements in plant material. At present the Department is in a position to make quantitative determinations on the cobalt, copper, and molybdenum content of plant ash. Methods for other minor elements of biological interest are being investigated.

Analytical Methods

The work on the brucine method for the determination of nitrate in meat and soil extracts has been completed and will be published this summer. Two methods are under development for the determination of boron — namely, a modified quinalizarin method and a benzoin fluorescence method.

Further work has been done on the quantitative estimation of plant sterols, and the efficiency of various solvents for the extraction of the lipid fraction of plant material is being studied.

In the determination of lignin in green plant tissue, a method has been developed for the continuous extraction of hydrolysis products which are thought to interfere with the estimation of the lignin.

DDT Content of Milk as a Result of Cow and Barn Spraying

Evidence from the United States indicated that undesirable amounts of DDT were present in milk when this insecticide was used to control the flies in a dairy herd. To secure additional information on the amount of residue present in milk, the College dairy herd was used.

A water suspension of a 50 per cent wettable DDT powder was used for spraying the cattle and the barn, both being sprayed on the same day at each spraying time. Intervals between sprayings were governed by the recurrence of an abundance of horn flies. Milk samples were taken on the day previous to spraying, and on the first, second, and third days after spraying and thereafter at weekly intervals. The DDT in the fat-freed extracts of these samples was determined by the methods of Schechter et al. The analytical data showed a very marked increase in the DDT content of the milk 24 hours after spraying, the DDT content in one case rising as high as 1.6 p.p.m. An appreciable drop occurred during the succeeding 48 hours, but one month after spraying the milk still contained about 0.5 p.p.m. of DDT. The results indicate that where both cattle and barns are sprayed, appreciable amounts of DDT may occur in the milk for quite some time after spraying.

A parallel study to the above was made on a dairy herd close to the College using methoxychlor. The results of this study were not conclusive, but indicate that at comparable times there was much less residual methoxychlor than DDT present in milk. This investigation and the one reported immediately following were undertaken at the request of the Department of Entomology.

Parathion Residues in Turnips

A series of quantitative determinations of parathion residues in turnips and in soil was carried out on samples taken from the Department of Entomology turnip plots. The residues on peel from plots which had received four weekly applications of parathion were quite low (0.2 p.p.m.) whereas following abnormally heavy applications the residues were considerably higher (1.2 p.p.m.). In no case was any parathion found in the pulp, thus indicating no translocation of parathion to this part of the plant. Residues present in the soil following heavy applications were negligible (0.02 p.p.m.).

Starch Analyses

At the request of the Department of Soils, starch analyses were carried out on 75 samples of ground corn.. A preliminary study of the calcium chloride polarimetric method showed that it could be used satisfactorily for this type of material provided that soluble carbohydrates were removed first, and that the usual concentration of material was halved in order to facilitate filtering. The starch values obtained are to be used in assessing the value of Ontario hybrid corn as a source for the industrial production of starch.

Dairy Chemistry Service

The dairy chemist in co-operation with the Department of Dairying carried out 76 individual analyses on samples submitted by the dairy industry. Analyses were performed on margarene and whipping cream substitutes at the request of the Dairy Branch, Ontario Department of Agriculture.

General Laboratory Service

Sixty-six special investigations were made to answer inquiries accompanying samples submitted. There is a great variety of material submitted for analysis, e.g. water samples, suspected contamination of feeds, animal organs from post mortem examination, maple syrup, etc. Each type of sample involves special analytical methods, and hence a great amount of time has to be spent on these requests.

The services of a member of the Department were supplied again this year to serve as an independent referee on the methods used by the Canada and Dominion Sugar Company in the test for the sugar content of sugar beets as they enter the refinery.

R. S. BROWN,

Head of Department.

DEPARTMENT OF DAIRYING

In addition to the usual instruction given to regular students the following short courses were held:

Short Courses	*No. Students*
Ice Cream Manufacture, April 4-8th, 1949	21
Ice Cream Manufacture, April 11-15th, 1949	13
Dairy Herd Supervisors, April 25-29th, 1949	13
Dairy Herd Supervisors, May 23-27th, 1949	10
Dairy Herd Supervisors, Aug. 22-26th, 1949	2
Dairy Herd Supervisors, Nov. 21-25th, 1949	7
Dairy School, Jan. 2-March 29th, 1950	50
Total	116

In connection with the 1950 Dairy School Three-Months Course — 47 Dairy Diplomas were awarded. G. H. Emerson, Stratford, Ontario obtained high proficiency honours.

We are greatly indebted to the Dairy Branch and to the Milk Control Board, Department of Agriculture, for their co-operation in making available to us the following three staff members during the Dairy School period:

J. C. Palmer, B.S.A. — Butter Instructor
Ross Arnott, B.S.A. — Market Milk Instructor
C. W. Hamilton — Cheese Instructor.

Commercial

Total milk purchased during the year		755,162 lbs.
Milk (pasteurized) sold to College Institutions	467,399	
Milk resold (raw)	162,681	
Milk manufactured into dairy products	91,143	
Milk separated	28,227	749,450 lbs.
Pounds milk carried over		1,839 lbs.
Pounds milk shrinkage		3,873 lbs.
		755,162 lbs.

Dairy products manufactured: Cheddar cheese — 7,116 lbs.; Soft and semi-hard cheese — 633 lbs.; Whey butter — 227 lbs.; Ice Cream — 912 gals.; Total pounds butter made from cream supplied by Guelph Creamery Company — 22,466 pounds.

Total sales revenue	$31,191.25
Total cost milk purchased	26,913.94
Increase or decrease	$ 4,277.31

Export Cheese Quality

A study on Canadian export cheese to determine the relationship between grade quality and *p*H value has been undertaken. *p*H values obtained on 187 samples at time of grading ranged from 4.80 to 5.25 in a normal type of distribution with *p*H 5.00 to 5.05 being the modal class.

Cheese of second grade occurred more frequently above the mode than below, while the opposite was true of cheese scoring 93 to 94 points. With one exception all the second grade cheese officially criticized as being "not clean" or "unclean" in flavour was in the upper *p*H category.

New Design of Cheese Vat

A modification of the standard cheese vat has been proposed and blueprinted. The new vat is designed to facilitate greatly the drainage of whey and the handling of curd in the process of manufacture.

Extraneous Matter Content of Cheddar Cheese.

This service was extended during the year to all factories in Central and Western Ontario. A total of 2,928 samples was tested during May to October with an additional series of 401 samples in a province-wide survey taken in September. The results for the year show a considerable improvement over those of previous seasons. However, approximately 24 per cent of the samples was classed as unsatisfactory.

Packaging Natural Cheddar Cheese

Considerable experience has been gained in the use of a commercial laminated film (Parakete) for use in the protection of square rindless cheese. Satisfactory results have so far attended the use of this film on 10, 20 and 40-pound cheese of the Cheddar and Colby varieties.

A two-level constant temperature apparatus has been developed for studying some of the factors which are thought to be involved in the evolution of carbon-dioxide from cheese. The cheese-holding chambers are of such a nature that the cheese will be held under conditions simulating curing room temperatures.

A Suggested Method for Measuring Milk Quality

Studies on the reducing capacity of milk including titration with ceric sulphate have resulted in the development of a new method which promises to be applicable to determining milk quality — mastitic infection, heat stability of casein, etc. Further work will be required to develop standards for normal milk. It is expected that this method will afford a simple and rapid procedure for use in field work and for inspection of milk on the receiving platform of milk plants.

Yeast and Mould in Butter

During the year 2,556 samples of creamery butter have been analysed for yeast and mould content. Seventy-five creameries participated in the service during the year. Of the total number, 666 samples were submitted by Dairy

Branch Field Instructors in connection with quality control problems. Assistance was given in the diagnosis and elimination of one outbreak of surface taint and one of discolouration in creamery butter — both of bacterial origin.

Fat determinations were made on 164 samples of whole milk and cream for farmers and dairy plants.

Storage Quality of Butter

Studies on the keeping properties of butter have been continued with special reference to the effect of churning acidity and *p*H of butter serum. A total of 194 determinations was made on 7-lb. butter solids manufactured by 46 Ontario Creameries; the butter was stored for a period of ten months at zero degrees F. The results for the year show a marked improvement in uniformity of acidity churning standards over those of previous seasons which, in turn, have reacted in favour of better keeping quality. The *p*H range for all samples averaged 6.70 to 7.03 which closely approximates the accepted standard for ideal storage. However, during the month of July abnormal *p*H values were observed indicating over-neutralization of churning cream caused, no doubt, by excessive initial acidity at this season.

PUBLICATIONS

Special Articles

1. Character of Ontario Butter Based Upon Analysis of Samples Submitted Over the Past Four Years — F. W. Hamilton, A. G. Leggatt, and W. H. Sproule; Can. Dairy & Ice Cream Journal, Dec. 1949.
2. Some Recent Developments in Packaging Natural Cheddar Cheese — O. R. Irvine & W. H. Sproule, Nov. 24, 1949 (unpublished).
3. Engineering in the Dairy Industry — A. M. Pearson, Can. Dairy & Ice Cream Journal, March, 1950.
4. Measurement of Milk Quality — A. G. Leggatt, Can. Dairy & Ice Cream Journal, March, 1950.
5. Cheddar Cheese Storage Plants — O. R. Irvine, Can. Dairy & Ice Cream Journal, March, 1950.
6. Bacterial Discolouration of Butter — A. G. Leggatt, Can. Dairy & Ice Cream Journal, July, 1949.
7. Merchandising of Cheese and Butter — W. H. Sproule, Jan. 12, 1950. (unpublished).

Agricultural Press Articles (Prepared for Dept. of Public Relations)

1. Milk is Still the Cheapest Food — W. H. Sproule, Feb. 4, 1950.
2. Sanitary Production of Churning Cream — F. W. Hamilton, Feb. 10, 1950.

W. H. SPROULE,
Head of Department.

DEPARTMENT OF ENGLISH

During the year the teaching load was increased by courses taught to the second year of the four-year course in Home Economics at Macdonald Institute. Also, five courses in English were taught to students in the first year of the new course at the Ontario Veterinary College.

Members of the Department were called upon to act as adjudicators in extramural public speaking and drama contests. Articles having to do with the subject matter of English were prepared from time to time for the Farm Press. Translation on work in French, German, Spanish, and Portuguese continues to be required by other departments, and members of the staff gave a good deal of time in private class instruction in English for foreign students in attendance at the College. The annual report of the College was edited by members of this department.

Extracurricular activities having to do with the work of the Department of English have reached a very high standard of interest and performance. A very large number of students participated in the debates carried on by the Students' Parliament, and this year the Inter-University Debating Team which was coached by a member of the Department reached the Dominion Finals, the second time in three years. In Dramatics, two plays, "My Sister Eileen" and "Old English", were successfully presented. In the field of Music, the Choral Society and the College Band both put on two very acceptable concerts. In addition, the former participated in a sängerfest held at McMaster University. Large audiences have enjoyed the Sunday Nine O'clock. In the English Division of the College Royal there were over two hundred entrants in the fields of Journalism, Music, and Radio Speaking.

The Head of the Department has carried on, for some three years, research into the Contribution of the Pennsylvania Germans to the Agricultural Life of Ontario. The contribution which these people made has never been appraised, although the findings so far show that they were the original farmers and gave the pattern to Agriculture in the Province, and practised conservation methods throughout the years. Historical data is difficult to obtain because it is only available in records found in family genealogies and in references found in the libraries of Pennsylvania. For these reasons progress is necessarily slow, but considerable progress has been made.

G. E. REAMAN,

Head of Department.

DEPARTMENT OF ENTOMOLOGY AND ZOOLOGY

Orchard Insecticide Tests

A comparison was made between dinitro-sec-butyl-phenol at 2 quarts to 100 gallons of water (DN-289), a paraffinic base oil ("Superior" type) at 2 per cent and a 200 viscosity oil (Ontario spray calendar specifications) at 2 per cent and 3 per cent against the European red mite. The dinitro material was applied at the dormant stage. All oil sprays were applied in combination with 7-½-10-100 Bordeaux at the time of the delayed dormant spray. All blocks received as well the regular sulphur-DDT-lead arsenate spray schedule. The infestation records were taken on McIntosh.

Counts on live mites and eggs were taken at 10 day intervals throughout the season. The delayed dormant oil sprays did not give protection throughout the season as was the case in 1948. The peak of infestation was delayed in the oil treated blocks and was delayed to a less marked degree in the DN-289 block compared to the check. Comparing the oil sprays, the 200 viscosity oil at both 2 per cent and 3 per cent gave longer protection than the "Superior" type. It should be remembered, however, that the blocks were not randomized.

An interesting observation can be made from a study of the mite counts. The check reached a peak of 48 mites per leaf on June 29 with the population dropping sharply after this. On July 25, when the DN-289 block and the "Superior" oil block had reached their peak, the check showed 16.8 mites per leaf. By the time the blocks sprayed with the 200 viscosity oil were at their peak (Aug. 8), the check dropped to 3.6 per leaf and it continued to drop for the rest of the season. The materials delayed the build-up of mites but did not prevent it.

Turnip Insects

Turnip Aphid — This was the dominant turnip pest of the '49 season and the major factor in causing a 61 per cent crop reduction in Western Ontario. Since former insecticidal recommendations were not effective in handling this aphid, some tentative plot and field tests using parathion were conducted to meet this emergency. The results were encouraging, and several farmers successfully tried out our preliminary recommendations — 1 lb., 15 per cent wettable parathion powder applied as a spray involving 50-100 gallons of water per acre, repeating if necessary.

Parathion Residues — The Department of Chemistry conducted chemical tests for the parathion residues in the plants and soils of our plots. It was found that these were very slight.

Root Maggots —

Year	% Infested Turnips O.A.C. plots, Untreated	No. Farms Sampled	Ontario Farms % Roots Infested
1948	60	32	26
1949	5.6	16	5.6

As the above table indicates, the root maggot population was very light during 1949 in most Ontario areas, although this pest was still a major consideration in the Maritimes in 1949.

Insecticides — Lindane was tested on O.A.C. plots (root maggot population on the College farm was low), but the lindane did not effectively reduce the

maggot. Furthermore, it caused some tainting of the root, according to taste tests conducted by the Department of Horticulture.

Parathion was tested on O.A.C. plots and used also on various farms for aphid control. In no case did parathion, at least at the dosages tested (1 lb. of 15 per cent wettable powder in 50-100 gallons of water per acre and up to 3 treatments) control root maggots.

Biological Studies — The life history and the habits of the adult flies were given particular attention in field studies. Co-operation with the Dominion Parasite Laboratory, Belleville, was continued.

Carrot Rust Fly

This department co-operates with the Dominion Division of Entomology on the study of this insect in the Holland Marsh. Some insecticidal treatments have showed some promise. Biological studies on this insect must be continued and expanded in the hope of finding ultimate cultural or insecticidal control. Work is being continued by the Dominion Division of Entomology on biological control. The Department of Horticulture co-operated in studying taint from insecticides.

Legume Seed Investigations (Legume Research Committee)

Insecticide treatments and observations on the insect fauna in alsike fields were conducted at Cayuga and at the Brampton Seed Farm. Similar studies on red clover insects were made at Cayuga later in the season.

The European Clover-seed Weevil *(Tychius picirostris)* is undoubtedly the most important insect involved in the reduction of alsike seed yields in these areas. Other insects present in large numbers include two varieties of spittle bugs.

In 1948, field tests indicated that DDT was the most suitable insecticide to apply to forage crops for seed production purposes. In the 1949 season, DDT was the only insecticide under test. The number of applications and the time of application were varied. The amount per acre used in all cases was 2 lbs. of the 50 per cent wettable powder (1 lb. actual DDT). Sprays only were applied, and all applications were made with a tractor-drawn power sprayer equipped with a 15-foot boom of adjustable height.

While the 1949 seed yields were extremely poor, largely on account of protracted drought, the treated areas all showed percentage increases of considerable magnitude (53 to 155 per cent), though the practical value of these increases was negligible. In other words, insecticide application in 1949 simply would not have paid.

It is now seen that two applications of DDT (bud and full bloom) have no advantage over one application and that the latter should be applied as the alsike is beginning to flower and not later.

The studies made in 1949 show that the reduction of insects on DDT-treated plots is temporary only and numbers rapidly build up again to equal those on untreated plots. The Department of Chemistry co-operated in determining DDT residues on alsike. At the DDT concentrations used there was a decided residue (12 to 24 p.p.m.) on the alsike at cutting time. The active repelling and killing of insects appear to be limited to a ten-day period following the application of the insecticide.

No recommendations can yet be made for treating red clover for increased seed yield. *Tychius griseus,* another weevil, seems to be an important factor in this connection.

Concurrently, work has been done on the effect of certain insecticides on the honeybee because of its importance as a pollinator. Primarily it was desirable to know to what extent DDT repelled and killed bees visiting sprayed legumes. Field trials with a 50 per cent DDT wettable powder spray showed that at the rate of 1 lb. actual DDT per acre it had some slight transient repellency. It had not the repellency in these trials that has been reported elsewhere (U.S.A.) for DDT dusts. The spray appeared to cause no bee mortality. These findings must, as yet, be regarded as tentative.

In the course of this field work the use of a fluorescent material for marking bees was studied and found to be very promising (Can. Ent. 81:173).

In addition some associated laboratory investigations have been started; in particular, a study of the effect of some insecticides on the bee when taken orally has shown promise.

Army Worm

In certain parts of the Province rather serious local outbreaks of army worm occurred. These were dealt with by visits of members of the staff with field demonstrations on control. When the first outbreak was reported a large part of Western Ontario was scouted to determine the extent of the infestation. Since the insect did not occur in outbreak form in a large area of the Province it is suggestive that the extreme hot, dry weather of early summer may have prevented a province-wide outbreak.

European Earwig

The general nature of this problem has been outlined in previous annual reports. Preliminary cage experiments with insecticides were continued. Ten per cent Chlordane gave an unsatisfactory kill, but showed some repellent effect, as the earwigs noticeably avoided the traps containing this insecticide.

Ten per cent DDT dust gave results that justify further tests. Five per cent dieldrin (497) spray and 5 per cent Chlordane in the relatively few tests made gave results that justify further study.

At this stage of the investigations it appears that fundamental study of the biology of the insect is a necessary preliminary to obtaining practical economic control. This study was begun with study of overwintering habits in the infested area.

Warble Flies

This department was active in the direction of the control studies carried on under the Ontario Warble Fly Committee program. In 1947 it was found that results in control by power spraying were so poor that it was decided to carry on a supervised power spraying program in Goderich Township, Huron County. A member of the staff of the Live Stock Branch was placed with the sprayer to see that cattle were as thoroughly treated as possible. Grubs from whole herds were removed and the mortality checked, not only in Goderich Township but in unsupervised treated areas.

The following table indicates the results. It should be noted that the two townships other than Goderich which gave good results were known to be particularly well treated.

Township	Number of Animals		Number of Grubs	Kill
		1947		
Goderich	171	(after first spray)	1,088	14.7%
Goderich	79	(after second spray)	386	37.1%
		1948		
		Supervised		
Goderich	643		2,368	81.1%
		Unsupervised		
A	101		442	56.8%
B	146		1,030	38.8%
C	70		492	85.2%
D	93		721	55.7%
E	45		303	57.1%
F	71		652	51.7%
G	111		437	36.8%
H	135		700	50.6%
I	52		150	52 %
J	44		306	84.9%

Since it is known from work in Western Canada and the Western United States that kills of over 80 per cent are necessary for commercial control, it is obvious that satisfactory results were not being secured in many cases. Over 11,000 grubs were removed and checked; of these, practically all were the European Ox Warble Fly, *Hypoderma bovis.*

The results proved that control of warble fly grubs in Ontario by power spraying as well as hand treatment is practicable. It was shown, however, that such spraying must be properly done to secure satisfactory results, and that large sums of money have been wasted by inefficient spraying.

The results provided the basis for the recommendations of the Ontario Warble Fly Committee with respect to the revision of the Ontario Warble Fly Act and the Regulations thereunder.

Since the work of previous years had established the practicability of community control programs for warble flies, and since many townships were under the revised Control Act, the chief investigation work in 1949 had to do with population studies. It was found that the average population of grubs in immature animals had been reduced in Goderich Township, which had been under fairly complete treatment for two years, to less than half the average population for herds in untreated areas.

In co-operation with the Live Stock Branch, schools for inspectors under the Act were conducted at convenient points.

Horn Fly Control

Tests on dairy herds for horn fly control were carried out with DDT and Methoxychlor. Spraying was done at monthly intervals at 250 lbs. pressure.

The Department of Chemistry co-operated in determining residues in the milk. As in previous trials, good control with DDT was secured, but residues in milk were such that we must recommend that DDT shall not be used on cattle for horn fly control.

Methoxychlor gave good results in control, and residues were so low that this insecticide is being recommended in 1950.

House Flies in Stables

Despite the varying reports with regard to failure of DDT to give control of flies in stables in 1949, good control with this insecticide was secured in the College dairy barn. Good control was also secured with Methoxychlor in another test. Where Methoxychlor is being used for horn fly control on cattle it may also be used for treatment of the stable for house fly control.

Spray Service

The spray service program for Ontario (outside the Niagara Peninsula) was carried out this year as previously. This program is produced and carried out as a co-operative effort between this department and other provincial and federal agencies.

Other Extension Work

Much of the time of the staff has been occupied by visits to meetings of producer groups and to centres of insect infestation.

A. W. BAKER,

Head of Department.

DEPARTMENT OF FIELD HUSBANDRY

Plant Introduction

The following improved varieties of crops were introduced from different experimental stations in the world during the year and are now being tested under Ontario conditions:

Grasses	168	
Legumes	158	
Roots	53	
Wheat	52	
Barley	143	(*Winter* & spring)
Oats	27	(*Winter* & spring)
Rye	22	(to find variety with greatest fall growth)
Peas	2	
Soybeans	14	
Chemurgic	47	(oil & drug, etc., special crops)
Flax	9	
Millets	14	
Sorghums	11	
Honey or Bee pasture plants	10	
Vegetables	14	
Total	744	

The importance of introduction work at the Provincial Experimental Station is very clear from the following facts:

(i) The majority of the improved varieties now being grown on the farms of Ontario are imports; i.e., potatoes, corn, roots, many of the grains, soybeans, etc.

(ii) They are a source of breeding material for developing disease-resistant varieties adapted to Ontario conditions.

(iii) Owing to the co-operation which exists between most of the experimental stations of the world, there is free exchange of varieties which may have cost many thousands of dollars to develop. Thus, it is a most economical way to secure improved crop plants for Ontario farms.

Cereal Crop Improvement

Barley

Testing of named barley varieties was continued during the year. These varieties included those in commercial production in Canada as well as new varieties released by experiment stations in Canada and the northern part of the United States. Tests also were carried out at Guelph and at five other locations on 18 promising strains of hybrid origin produced by this department, the Central Experimental Farm, and Macdonald College. These strains were evaluated on the basis of yielding ability, strength of straw, maturity, grain quality, and

malting quality. Three of the tests were so poor as to be of little value because of the very unfavourable season in 1949. The other three were satisfactory.

Hybridization of varieties and strains was continued with the object of combining favourable agronomic characters with disease resistance. This hybridization program gives rise to a great number of strains of barley which have to be evaluated for agronomic characters and resistance to the various diseases which attack barley. Over 1,200 strains were grown in the experimental plots, while several thousand second and third generation plants were grown in the greenhouse and inoculated with powdery mildew. The use of the greenhouse enabled the detection of susceptible plants which can be discarded in the seedling stage, thus saving much time and space in the field the following year.

A crossing program in winter barley was undertaken in an attempt to add greater winter hardiness to the variety Wong. The Department also co-operated with the U.S. Department of Agriculture in the testing of a large number of winter barley strains to determine better sources of winter hardiness that can be used in a hybridization program.

Investigations were carried out to establish the protein content of varieties to be used in a study of protein inheritance in barley. Studies also were made of the variation in per cent protein in different spikes of the same variety and in different parts of the same spike. A study also was made of the effect of commercial application rates of 2,4-D on grain protein and certain malt properties.

Experiments were conducted to determine the effects of different seeding rates on yield, protein content, and malting quality. Such experiments have been conducted in the past, but information on the effect of seeding rates was needed on the newer varieties.

Investigations were carried out to determine the effect of powdery mildew on barley when infection occurred at different times during the growing season. Mildew has been the most serious disease of barley in this area for over ten years, and this investigation showed that yield reductions of 40 per cent could occur in O.A.C. No. 21 and Montcalm barleys when infection occurred in the early stages of plant development. An intensive breeding program for mildew resistance has been carried out since 1941, and a number of promising strains are now in final tests in several locations in Ontario in order to determine the best strain or strains to release to growers. Unfortunately, the abnormal growing season of 1949 did not give much information on the relative value of these strains.

Oats

Commercial varieties and strains from oat-breeding stations were tested in the experimental plots during the growing season of 1949. The most promising strains from the Ontario Agricultural College, the Central Experimental Farm and Macdonald College also were tested in five other locations to determine their value in different areas of Ontario.

Hybridization work and the testing of hybrid strains continued during the year. This work has been increased in view of the change in the races of crown rust during the last few years. The only varieties of oats grown in Ontario which are resistant to these new races of crown rust are Beacon, Garry, Vicland, and others of similar parentage which are susceptible to the equally serious disease, Helminthosporium blight. Strains of oats have been discovered which are resistant to these new races of rust and crosses have been made between these strains and varieties which are adapted to Ontario.

Winter Wheat

The breeding work with winter wheat has increased with 12 new crosses made during the year. New varieties added to the Regional Test include Vigo from Indiana, Blackhawk from Wisconsin, and Butler from Ohio. All are red wheats. Sixty rust-resistant varieties of wheat were received during the year from Kenya Colony, East Africa.

A new semimicro method of protein analysis has been developed. By this method very small samples of wheat, flour, or other materials may be analysed for protein content. It requires much less space than the ordinary method and is more rapid and less costly. The accuracy of the two methods is similar.

The summer of 1949 at Guelph was extremely dry. Nevertheless, plants which received almost no rainfall from Easter to harvest yielded from 35 to 40 bushels of wheat per acre. This prompted a study of the root system of wheat. A trench was dug alongside the mature plants and the soil was carefully washed away, revealing that the roots had penetrated the soil to a depth of 57 inches.

The quality of winter wheat is greatly affected by soil and climatic conditions. Adverse conditions may almost render the crop unfit for sale as a cash crop. A study of the effect of soil on climate was begun by a graduate student in 1949. Plots of wheat have been sown on three different soil types, and an intensive study will be made of the soil type, soil fertility, soil moisture, and climatic conditions. The plants will be analysed chemically at different stages of growth.

Forage Crop Improvement

Selection and Breeding—Breeding work is being carried on by the Forage Section of the Department on several species of forage crops. Nurseries of orchard grass, brome grass, timothy, meadow fescue, perennial rye grass, red fescue, red clover, ladino clover, and alsike clover are, at present, established for selection and breeding work. Polycross studies in alsike clover are under way.

Seed Production—The production of Foundation Seed of several varieties of forage crops is carried out at our Brampton Seed Farm. At present, 90 acres of Foundation Seed is being grown. The varieties at present in the rotation at this farm are Redon red clover, Alon alsike, Mefon meadow fescue, Medon timothy, Peron perennial rye grass, and Oron orchard grass.

During the past few years there has been an increasing demand for Foundation Seed of forage crops. In 1949, over 3,200 pounds of Foundation Seed was distributed to 35 growers in several different counties. A greater demand is expected in 1950.

Hay and Pasture Studies—Hay and pasture investigational work is continuing as in the past. Various combinations of grasses and legumes are under test to study their productivity at various times of the growing season, their total production, and their nutritive value. Rather extensive hay and pasture tests were seeded this year, but excessively dry weather caused their abandonment.

U.S.D.A. Hybrid Alfalfa—This test was designed to check the yielding ability of our old open-pollinated varieties against new synthetic and hybrid alfalfas. Both hay and seed yields are taken into consideration in this work. The results, at present, look quite promising. Several new synthetics appear particularly good.

Seed Setting Studies—This year, as in the past, the Department has co-operated with other departments and the Legume Research Committee on seed setting in forage crops. Yields on over 800 plots were harvested and computed.

Surveys were made of seed setting in different areas. Studies on burning old grass stands were carried out and its effect on seed yield measured. The effect of defoliates on seed setting in red clover and alfalfa was studied, and investigations re field plot technique were carried out.

Tests with Field Corn and Soybeans

Corn—For a number of years past the Department has co-operated in conducting license tests of the new hybrids which various companies wish to have licensed for sale in Canada. These are tested at Guelph and at Brantford in comparison with proven hybrids of similar maturity groups.

During the summer of 1949, 20 lots were planted in quadruplicate plots at Brantford. This was a grain corn test only. Several lots were sufficiently outstanding to be recommended for a license. At Guelph, 36 lots were tested for grain corn production and 19 lots for fodder production.

On the whole the growing season was quite favourable for the production of corn and somewhat better than average yields of both grain and fodder were secured. As occurred in the Brantford tests several lots showed more than average promise and will be tested further in 1950.

Soybeans—The Department co-operated with the U.S.D.A. in its regional test program with new soybean varieties. The complete Group O (Very Early) and Group I (Medium Early) tests were planted at Guelph, and records kept of their relative performance. These tests include some promising new varieties which may, in a few years, be available to Ontario growers. In addition tests were planted in various soil-climatic zones using the varieties thought to be most promising for each zone.

Breeding was continued with the Mandarin variety and a special Foundation block established of the recently Registered early variety Flambeau. The Department has been assigned the responsibility of maintaining Foundation Stock of this variety.

Potato Improvement

Potatoes Resistant to Scab, Blight, and Physiological Diseases—On the Potato Farm approximately 1,000 seedlings are grown each year. These seedlings are from parents possessing resistance to scab, blight, and virus disease, and are supplied by the Dominion Department of Agriculture in the National Potato Breeding Program. In addition to the seedlings all newly named varieties are imported as soon as possible after release and tested for their adaptability to Ontario conditions.

The promising selections at the Potato Farm are grown in the different potato-growing sections on farms where specific problems exist in order to determine their reaction to the most severe conditions.

Plant Nutrition Studies—The effect of varying amounts of nitrogen, phosphorous, and potash on the yield and quality of potatoes was studied. These ingredients are applied to potatoes grown in a suitable rotation to endeavour to determine the best, most economical fertilizer for potatoes.

Quality—In all tests emphasis is placed on the quality of the potatoes produced. Quality is determined by means of specific gravity tests and by actual cooking. It is becoming more evident each year that more research will, of necessity, be devoted to the improvement of potato quality.

Potato Scab Research—The contribution of this department to the Potato Scab Research Program is the development and testing of varieties resistant to potato scab. The tests are conducted in six potato-growing areas where scab is a definite problem. At the present time potatoes resistant to scab have been developed, but additional work is necessary to improve the quality of the tubers.

New Undertakings—It is anticipated that moisture studies will be added to the list of projects in 1950. Moisture will be measured with the Bouyoucas moisture meter and water applied by overhead irrigation. Plans to convert the bank barn to a common storage have been completed, and automatic temperature controls will be installed.

Co-operative Testing

The rod row method of testing crops in different regions was put into effect by the Department about ten years ago, and is designed to give farmers the opportunity of testing in their own localities the many new varieties and strains of crops which are being developed. By this plan information is now available on varieties which have been tested side by side over the greater part of Ontario in more than 200 individual tests. Many of these varieties which have come to the top in yield, disease resistance, and other desirable qualities, have now taken the place of less productive types which were formerly grown.

In 1949, there were 28 rod row tests with oats, 23 with barley, 20 with corn for grain, and 20 with soybeans. The total number of individual plots was 2,992.

Seed for these plots was provided by the College, and the harvested grain was sent in for threshing. Most of the tests were visited during the summer by the crop extension specialists.

Apart from providing information on the test varieties for the districts in which these tests are conducted, the plots furnish a good setting for field meetings to be held just before harvest, and when the final yields have been computed the standing of the various varieties can be discussed to advantage at meetings of Crop Improvement Associations.

New Developments

The Department has been making a study of the relative efficiency of the newer experimental designs for crop testing. The great increase in numbers of new varieties being developed presents the problem of adapting a plot design that will permit of the determination of as small significant differences as possible in relative yielding capacity.

A study is being made of the breeding behaviour of small grains in successive generations following hybridization. This is being accompanied by studies of the reaction of the new hybrids to individual strains of the various rusts.

A breeding program has been started with both soybeans and field corn in order to produce types better suited to Central Ontario conditions.

Co-operative studies, involving the Field Husbandry and Soils Departments, have been planned to study the effect of various grasses and legumes alone and in

various combinations on soil structure and chemical content at various periods after seeding.

A new development in wheat breeding is the production of lines lacking one chromosome termed "monosomics", and others lacking a pair of chromosomes designated as "nullisomics". Such material is very useful in studying the inheritance of characters. Breeding material of this kind is available for spring wheats; this has been secured, and it is proposed to develop a similar series for winter wheat, and thus open up an entirely new field of research with this crop.

In the potato improvement projects a series of investigations on the effect of irrigation on quality and quantity of the harvested crop is planned for the summer of 1950. A satisfactory supply of water is now available on the O.A.C. Potato Farm, and equipment for soil moisture determinations has been secured. This will provide a new investigational approach to a number of problems concerning potato production.

G. P. McROSTIE,

Head of Department.

DEPARTMENT OF HORTICULTURE

Teaching

The staff of the Department of Horticulture met with the students in 71 lecture and laboratory periods *per week* each term.

Special Courses

Special short courses or schools of one, two, or three-day duration were arranged for commercial florists, canners, nurserymen, greensmen, and gladiolus growers. These special courses have been very well attended, are increasing in popularity, and are arranged in co-operation with organized bodies or groups.

Processing Vegetables

In this project, 97 varieties of vegetables were canned, and 127 varieties were frozen. The purpose of this work is to test new varieties and hybrids that are being continually developed and give a rating of their value for canning and freezing purposes. A promising new variety or hybrid is tested for three or more years before its rating is accepted. Results of these tests are forwarded to the plant breeders concerned and to other interested persons. Lists of new varieties and hybrids of value are published at intervals.

Storage of Cucurbits

Work continued on storage tests of 12 varieties of melons and 9 varieties of squash. Rapid loss of quality occurred in most varieties of melons under any condition of storage. Squash stored best at 44°F. An antibiotic proved of no value in prolonging storage life.

Plum Storage

The purpose is to evaluate delayed storage and temperature conditioning as methods of retarding or preventing physiological breakdown in stored European-type plums.

The results of four years of investigation indicate that Grand Duke, Reine Claude, and President plums are free from any serious physiological disorders during storage. They can be stored successfully at 31°F. - 32°F. for six weeks with fair to good retention of quality. These three varieties would appear suitable for export purposes or domestic storage.

The Stanley plum is especially susceptible to the development of translucency, and often jellies during storage. Moreover, it loses its flavour greatly after three weeks. For these reasons its use should be restricted to local markets.

The Italian Prune appears to be unpredictable in respect to its storage possibilities. In at least one of the four years of investigation it suffered severely during storage from internal browning. In three of the four years translucency was present in varying amounts. This year it was also lacking in general quality. Its field characteristics, heavy plantings, and attractive appearance of the fruits make it highly desirable for export purposes.

Future investigational work re plum storage will be concerned chiefly with this one variety; namely, Italian Prune.

Waxing of Stored Nursery Stocks

Twenty-four varieties of ornamental nursery stocks including 534 specimens were sprayed with seven types of cold wax emulsions previous to winter storage at 32°F. and high humidity. The purpose is to compare this method with the standard "mossing" procedure now practised. Results will be determined on a survival basis when field planted in 1950.

Frozen Foods

In this project 54 baked pies and 54 unbaked pies were frozen for later laboratory tests. Various types of fruit fillings, pastry ingredients, and thickening agents are being compared. Tests were made of 22 procedures (including four commercially used antioxidants) to prevent oxidation and browning in frozen apples.

Common Storage

Studies were continued on the performance of common storages equipped with automatic ventilation controls. Keen interest in this new development has necessitated giving considerable time to extension work.

Lima Beans

Lima beans rank high as a frozen vegetable. Definite progress is being made toward the development of hardy, cold-resistant, green-cotyledon types especially suited to the freezing industry.

Breeding Improved Vegetables

This project includes genetic studies of late blight resistance in the tomato, and development of a Septoria leaf spot, true breeding, resistant stock of tomato. Plants are being grown to illustrate the chromosome map of the tomato and its role in breeding work.

Tomato Defoliants

Cyanamid dust has been used successfully in trials to remove tomato foliage for earlier ripening for canning without loss of quality.

Cloches

Cloches are small glass houses that can easily be moved from place to place in the field. Gains in earliness have been 9 days in lettuce, 16 days in Rutgers tomato, 12 days in muskmelon, and 14 days in watermelon.

Early Sweet Corn Inbreds

Certain early Canadian varieties have undergone three generations of selfing and are now approaching uniformity. The aim is to obtain extra early inbreds with good combining value for the production of hybrids.

Greenhouse Vegetables

The work with greenhouse vegetables includes: (a) effects of low, medium, and high concentrations of sulphate, chloride and total chemical salts on the growth and fruiting of the tomato; (b) effect of potash in the control of blotchy

ripening of tomato fruits; (c) greenhouse cucumber, lettuce, and tomato variety tests; (d) extension service to growers based on soil analysis.

Vegetable Variety Trials at the Holland-Bradford Marsh

Brigham Yellow Globe for the main crop and long term storage and Early Yellow Globe for early harvest and short term storage seem to be the best onion varieties. In lettuce, good strains of Imperial 456 have surpassed all other varieties for plantings of the early to late crops. Pennlake has shown promise as a replacement for Imperial 456 in that it has darker green colour and more resistance to tipburn. Kennebec has shown promise as a worthwhile potato variety.

Weed Control in Onions at the Holland-Bradford Marsh

Results would seem to indicate that the following program should be followed: (a) pre-emergence application of calcium cyanamid (special grade dust or granular) to control the first flush of weeds; (b) post-emergence application of potassium oxycyanate (spray) to control weeds after the crop has emerged.

Lily Breeding and Research

Two new varieties, "Goldcrest" and "Waxwing", were introduced in fall of 1949 following receipt of appreciative trial reports. Both are early varieties flowering in June when few lilies are available.

The new lily varieties, Cardinal, Goldcrest, and Waxwing, are all sterile, and represent the end of their line of breeding unless fertility can be induced. Scales of these lilies have been treated with colchicine to induce polyploidy. Preliminary examinations show evidence of polyploid tissue among new bulblets produced by treated scales.

Gladiolus Variety Trials

A test garden for testing new gladiolus seedlings prior to introduction was operated in co-operation with the Canadian Gladiolus Growers' Council. One hundred and seven different seedlings were tested under this plan. A number of new named varieties were grown and tested during the year.

Effect of Temperature and Nutrition on Flowering and Spray Formation of Spring Chrysanthemums

By manipulating day length, temperature, and nutrition, it is commercially feasible to produce chrysanthemums at any season of the year. Spring flowering chrysanthemums are fast becoming an important greenhouse crop in the florist industry owing to their wide colour range and variation of type. They are also extremely useful to the retailer during March to June when other types of flowering stock are scarce. Inducing budset and producing good quality bloom during seasons of low light intensity have presented a complex problem to the growers. Great progress has been made in overcoming these difficulties.

In an experiment conducted to study the effect of temperature and nutrition on the flowering and spray formation of spring-flowering chrysanthemums, eight commercial varieties were grown under (a) low temperature 50-55°F., with high and low nutrition and (b) high temperature 60-65°F., with high and low nutrition.

Results of this work indicated that at high temperatures, nutrition did not affect the type of budset. But the plants grown at high nutritional levels pro-

duced heavier flowers of better quality than those grown at low nutritional levels. Under conditions of low temperature, high nutrition had a marked effect on the budset; two varieties remained completely vegetative, and did not set normal flower buds. Under low nutritional levels, budset and flower development were comparatively normal.

All plants were grown under conditions of long day by the use of artificial illumination until the time of budset (January 2nd); then the days were shortened by the use of dark cloth.

Automatically Controlled Air Storage for Temperature Treatment of Tulip Bulbs for Forcing in January to June

Bulbs held under various controlled temperatures were forced at weekly intervals to determine the time of bloom. Under controlled storage conditions bulbs can be timed to $\pm$ 3 days.

Direct Planting of Daffodil Bulbs in Various Growing Media

The bulbs were planted directly into a greenhouse bench where they were flowered. Excellent flowers were produced in sand and peat. These flowered earlier than in any other media.

Black Spot and Leaf Drop Diseases of Roses

This work has been in progress for two years, and the organisms causing leaf drop of roses have been identified.

Culturing of Carnation Cuttings for the Production of Disease-Free Stock for Commercial Greenhouse Operators

Representative varieties of carnations are now being grown in the greenhouse, and the work of culturing has started.

Nutrient Culture of Snapdragons and Chrysanthemums

This work has been in progress for a four-year period. The object is to determine the balance and intensity of nutrient solutions under varying seasonal light conditions. Optimum nutrient levels have been determined for various seasons of the year for the two crops mentioned.

Automatic Watering and Constant Water Level for Growing Roses

Four automatic constant water level benches are being tested for production against the conventional overhead watering and Skinner Superior Nozzle system operated by a tensiometer. The production of bloom in the constant water level beds has been equal to the conventional methods at a considerable saving of labour.

Nutrient and pH Control Studies of Gardenias

The object is to adjust nutrient levels under varying light conditions for the prevention of bud drop. The control of *p*H is also an important factor in the growing of gardenias particularly in high calcareous soils to prevent iron chlorosis. With less than 3 per cent bud drop 74.9 blooms were produced per plant.

Testing Various Methods of Application of Parathion and K-6451 for the Control of Two-Spotted Greenhouse Mite

New methods of application have been found to be very effective.

Soil Tests

The soils laboratory of the Department has analysed 7,000 samples for florists and producers growing vegetables under glass including producers of young tomato plants for the canning industry. Reports and recommendations are sent to growers regarding fertility control.

J. S. SHOEMAKER,

Head of Department.

DEPARTMENT OF PHYSICS

Student instruction again constituted the main work of this department. The usual number of courses was given to the students in Agriculture. A completely new course in General Physics was organized and given for the first time to the first year Ontario Veterinary College students. This course, consisting of three lectures and two laboratory afternoons per week, was designed to teach the fundamental physical principles involved in Veterinary Medicine and research.

Because of the large number of students taking the post-graduate course in Statistics the time given to instruction and the scope of the work covered were almost doubled. Fifteen students took the course and wrote the examination as a requirement for the M.S.A. Degree.

A new electrical laboratory was installed with the necessary outlets and equipment to give the third and fourth year students an improved course on electricity for farm power purposes including 25 and 60 cycle, both single and three phase as well as direct current. Students make a detailed study of the characteristics of both D.C. and A.C. generators, including car generators, and of all types of single phase fractional horse power A.C. motors. Experiments are made on the function and characteristics of a transformer, and also on electronics to show the characteristics and some uses of the electron tube.

The collection and tabulation of weather data in collaboration with the Meteorological Division of the Dominion Department of Transport continues to require a considerable amount of the time of a member of the staff and of the secretary. These data are used by many departments of the College. Daily readings are given to the local press and to an oil company for predicting furnace oil requirements.

At the request of the Department of Apiculture a complete set of weather data instruments with shelter was provided for Pelee Island in connection with its queen-rearing station. This enabled the Department to procure desirable temperature, humidity, rainfall, and sunshine readings there. A similar set was installed at Brampton seed farm at the request of the Department of Field Husbandry.

The Department continued as a contributing member of the Legume Research Committee by collecting, tabulating, and analysing the necessary weather data.

An increase in assistance was rendered to other College departments through consultation and advice on Physical problems, on experimental design, and on analysis of data. Considerable assistance was given to the Department of Chemistry in connection with its spectrograph and the building of a pre-amplifier for its Geiger counter. A meter was designed and built for measuring temperatures with thermocouples used by the Department of Agricultural Engineering.

R. C. MOFFATT,

Head of Department.

DEPARTMENT OF POULTRY HUSBANDRY

The first Poultry Option Class was graduated, totalling eight students. Courses were given to students in Agriculture, Home Economics, and Veterinary Science. Three Short Courses were conducted: a Chick Sexing School in November with 9 students, an Egg Grading Course in December with 13 students, and the Annual Poultry Short Course in January with 18 students.

Breeding

Tests were begun of the genetics and purity of colour type in White Plymouth Rocks and White Cornish, with a view to determining their usefulness in cross-breeding.

Matings were continued in an attempt to establish any possible genetic relationship in the occurrence of non-pullorum reactors.

The turkey breeding project shows considerable promise, full use being made of stock placed at the Ontario Hospital Farms to supplement the flock at Arkell.

Turkey Hatching

The importance to hatchability of stage of development at time of transfer to the hatching compartment, established in 1948, was further confirmed. Allowing an additional 24 hours in the setting compartment for eggs with embryos not ready to pip on the 25th day, as revealed by candling, improved the overall hatch of fertile eggs by five per cent. Comparable results were obtained in field tests at two commercial hatcheries. For future breeding stock, the selection of eggs of uniform size (3.0 to 3.5 ounces, in the case of young hens), and of early hatching poults, appears to be sound practice.

Nutrition (Co-operative with Department of Animal Nutrition)

Manganese interrelationships in chick nutrition — A comprehensive series of comparisons was made, as listed below, involving rate of growth, feed efficiency, incidence and severity of perosis, and percentage bone ash; also, in several of the experiments, mineral analyses of bones, phosphorous partition analyses of blood, and other pertinent estimations.

(a)	The interrelationship	between	manganese	and	magnesium
(b)	"	"	"	"	sunlight
(c)	"	"	"	"	vitamin D.
(d)	"	"	"	"	salt and phosphorous
(e)	"	"	"	"	calcium and phosphorous
(f)	"	"	"	"	niacin
(g)	"	"	"	"	niacin and tryptophane
(h)	"	"	"	"	niacin, choline, and ascorbic acid.

For the sake of brevity the results of the above experiment are omitted; they will be submitted for scientific publication.

Broiler feeding experiments — These experiments were designed to determine what supplements are necessary in a diet consisting largely of solvent process

soybean meal and corn, with vitamin B_{12} (1 mg. per 100 lbs.). Supplements tested were soybean oil, ascorbic acid, potassium iodide, choline chloride, calcium pantothenate, d-1 methionine, B Y supplement in place of synthetic riboflavin, and additional B_{12}. In addition the diet was supplemented with either 2 per cent fish meal, 4 per cent milk powder, or 2 per cent fish and 4 per cent milk. Finally, the fish-milk diet was supplemented with each of the foregoing materials — soybean oil, ascorbic acid, etc. New Hampshire male chicks were used throughout.

Commencing at six weeks, half of each lot were fed the starting diet plus 50 lbs. corn and small amounts of minerals and vitamins per 100 lbs. mash, thus reducing the protein content and raising the energy content without altering the levels of critical nutrients. The other half of each lot were fed the same mash as before.

The birds on practically all diets averaged in excess of three pounds live weight at ten weeks, with a feed efficiency of about 2.8 pounds of feed per pound gain. They were then slaughtered and graded for fleshing and finish.

Again, the details of procedure and results will be submitted for scientific publication.

Sunflower seed oil meal in turkey starter diets — The purpose was to establish the value of sunflower seed oil meal in so-called "pre-starter" diets. Five lots of Broad Breasted Bronze turkeys were used. The meal was fed as 7, 14, 21 and 28 per cent of a 28 per cent protein diet the first four weeks, and at 5.5 and 11.0, 16.5 and 21 per cent respectively in a 26 per cent protein diet from four to eight weeks. The birds were reared on litter and had access to slatted porches after the fourth week.

Sunflower seed oil meal proved satisfactory for growth when up to 21 per cent was used to four weeks, and up to 16.5 per cent from four to eight weeks. Lysine deficiency was noted in all lots fed the sunflower meal, indicating a greater requirement of lysine for normal feather pigmentation than for growth.

Feeding methods for starting and growing turkeys — Poults started on a 28 per cent protein diet and fed a 24 per cent diet from four to nine weeks made better gains from 9 to 15 weeks on a 20 per cent protein mash plus grain than on the mash alone. Poults fed a 24 per cent protein mash to nine weeks made better gains from 9 to 15 weeks on a 20 per cent protein mash without grain. Regardless of the feeding method after four weeks, the birds started on the 28 per cent protein diet were somewhat heavier at 24 weeks.

The results indicate that if turkeys are started on a high protein diet the protein requirement from 9 to 15 weeks is less than 20 per cent.

Pathology

The experiment on cholesterol feeding and excitation as factors in the production of atherosclerosis and coronary thrombosis in chickens, outlined in 1946 and conducted in collaboration with the Pathology Department, Medical School, University of Western Ontario and the Department of Animal Nutrition, O.A.C., was terminated during the year. The birds were excited at frequent intervals during the four-day period prior to killing, in an effort to produce coronary thrombosis. Results of this final phase of the experiment have not yet been worked out.

Marketing

The experiment on cold storage of turkey steaks was continued, and a preliminary study of wet and dry methods of evisceration of broilers was begun, both in co-operation with the Department of Bacteriology. The results so far are largely bacteriological in nature and will be reported by the Bacteriology Department.

Extension

The drastic break in egg prices in December brought an added load of meetings, interviews, and correspondence. In this connection the Photographic Service co-operated in preparing an illustrated guide to culling hens which received wide distribution.

The annual summer conference was held in June, being combined with the former nutrition conference in a five-day session known as the Ontario Poultry and Live Stock Conference. The Ontario R.O.P. and Approved Hatchery Associations held their annual meetings prior to the general poultry sessions, the latter reached an attendance of 550 persons.

One or more members of the Department attended some 23 meetings of the Poultry Industry Committee, the Ontario Turkey Association and the Canadian Baby Chick Association. Speakers and assistance were supplied for 29 meetings of poultry clubs and associations, feed dealers' associations, and for general poultry meetings.

From one to three hours of lectures, some of them illustrated, were given at eleven Short Courses arranged by the agricultural representatives in various counties. Some of these were held in the evening at local high schools. Fourteen culling, killing, and caponizing demonstrations were given at various centres.

Judges were supplied for production, meat, and other classes at eleven Fall Fairs and Poultry Association Shows, including the Lakeheads Exhibition and the Royal Winter Fair.

Forty-three special trips were made to individual farms to discuss problems of housing, hatching, feeding, and disease.

Sixty-three other trips were made in connection with the summer Conference, the Poultry Science Meetings, printing, radio interviews, and similar matters.

Material was prepared weekly through most of the year for release to radio stations and the farm press. A number of articles were also prepared for various farm and poultry papers.

The Department was represented at the Northeastern Pullorum Conference, Ithaca, the Cornell Nutrition School, Buffalo, and the Fact Finding Conference, Kansas City.

Flock Approval Policies

Total number of birds pullorum tested in the 1949-50 season was 1,034,158, a reduction of 2,682 from the previous season. A slight reduction in chickens and a considerable increase in turkeys will be noted.

Poultry Department Staff assigned to the work included the supervisor and assistant, two office secretaries and two field inspectors, all virtually full-time, and three fieldmen for a period of three to five months. Forty-two temporary

inspectors worked a total of 3,094 days under the supervision of the Department. In addition, R.O.P. inspectors of the Dominion Department of Agriculture spent 411 days, mainly in banding non-R.O.P. birds and testing all birds on R.O.P. premises, and in the banding and testing of turkeys.

The Department of Bacteriology provided and supervised the testing laboratory and performed the reading of all tests made in that laboratory. The Poultry Department provided eight women technicians part-time in the laboratory. Rapid-testing in the field was done by Poultry Department inspectors, these being checked from time to time by a member of the Bacteriology Department staff.

Ontario Poultry Breeding Station Policy — A total of 998,269 chickens in 2,167 flocks was pullorum tested, compared with 1,007,604 in 2,264 flocks in 1948-49. Further increase occurred in the proportion rapid tested, as shown here:

	1948-49	1949-50
Birds rapid tested	63.8	69.9
Birds tested, O.A.C. Laboratory	16.5	13.9
Birds tested, Approved Laboratories	19.7	16.2
	100.0%	100.0%

Total samples tested, including retests were 1,099,040, with 0.27 per cent reacting to first test compared with 0.29 per cent in 1948-49. Forty-six flocks were withdrawn after the birds were inspected and tested. Total flocks approved were 2,121; of these 1,944 were clean on first test, and 115 on second or subsequent tests, making a total of 2,059 flocks with no reactors on final test and 62 flocks with 1 per cent or less.

Ontario Turkey Approval Policy — A total of 35,891 turkeys in 163 flocks was pullorum tested, compared with 29,236 in 139 flocks in 1948-49. Percentage reaction to first test was 0.028, compared with 0.013 in 1948-49. The total number of approved flocks was 162, of which 161 had no reactors and one flock had one reactor. One flock with over 1 per cent reactors was withdrawn. All turkey samples were tested by the tube method, 88.8 per cent by the O.A.C. laboratory and 11.2 per cent by approved laboratories.

The pullorum testing of flocks not under approval included chickens at the Dominion Experimental Stations at Harrow and Kapuskasing, the Provincial Experimental farms at New Liskeard and Ridgetown, the Ontario Hospital, Hamilton, and the O.A.C. Poultry Plant; turkeys at the O.A.C. Turkey Farm; pheasants at the Provincial Game Farm, Vittoria, and the Peel County Game Association, Brampton. Total tests for the above were 7,603 chickens, 202 turkeys, 1,765 pheasants.

RESEARCH PAPERS PUBLISHED, 1949

1. Soybean oil meal and sunflower seed oil meal in rations for Broad Breasted Bronze turkeys. S. J. Slinger, D. C. Hill, K. M. Gartley, and H. D. Branion. Poultry Science 28, 4, 1949.

2. Further observations on the use of sunflower seed oil meal in turkey starter rations. K. M. Gartley, S. J. Slinger, and D. C. Hill, Poultry Science 29, 2, 1950.

3. Pelleted and unpelleted diets high in dehydrated green feeds for turkeys grown in confinement. S. J. Slinger, K. M. Gartley, and E. V. Evans, Poultry Science 28, 4, 1948.

4. Coronary sclerosis in chickens. J. C. Patterson, S. J. Slinger, K. M. Gartley, C. A. Mitchell, A. C. Wallace, and G. E. Cottral. Poultry Science Association Proceedings, 1949.

J. R. CAVERS,
Head of Department.

DEPARTMENT OF SOILS

Soil Surveys

Detailed reconnaissance surveys on 1,400,000 acres were made during the season of 1949. Four field parties, each consisting of a party leader and an assistant, and a Supervisor of soil surveys were engaged in this work under a joint Dominion-Provincial arrangement. Surveys of Grey, Bruce and Stormont Counties were completed, and reports were partially prepared. Progress was made in surveying Ontario and Russell Counties. The main soil problems including fertility maintenance, erosion control, and drainage requirements that exist singly and in various combinations in the areas were included as bases for special classification. Detailed soil surveys and reports were made of the College Seed Farm at Brampton, the College Potato Farm at Hespeler, and three Dominion Illustration Stations.

Data on chemical and physical properties of representative topsoil samples of the different types mapped in Lambton, Dundas, Grenville, and Huron Counties were compiled in the laboratory. A laboratory study of the morphological, physical, and chemical characteristics of a typical Brown Forest Soil profile (Osprey loam) found in Grey County was conducted in order to provide a basis for describing and classifying such Ontario soils.

Reports and Soil Survey maps for Essex and Prince Edward Counties were printed and distributed. For Grenville County the map was printed during the year, and the report is in the process of printing. Soil maps for Huron, Perth, and Dundas Counties were redrawn for publication, and a manuscript for the Dundas report was prepared.

Soil survey personnel provided assistance to the Departments of Municipal Affairs, Highways, and Veterans' Affairs in interpretation of maps and data. They also participated in a joint United States-Canada soil correlation trip in Ontario, Michigan, Illinois, Indiana, and Ohio.

Soil Management Advisory Service

Recommendations for fertility replenishment and soil management were provided 3,363 farmers and gardeners for 8,935 fields and gardens. Information on soil tests, crop performance and history, and soil survey data form the basis for such recommendations. Personal visits to render advisory service on soil management were made to 625 individual farms on requests received through district agricultural representatives as well as directly from farmers. Farmers were encouraged to take advantage of the advisory service offered through personal interviews with staff members engaged in extension in the Department and through correspondence and by telephone. Lectures and addresses on soil management were given at 160 rural meetings, including short courses in Agriculture.

Advice and assistance were offered to County Crop Improvement Associations, Junior Farmers' Organizations, and agricultural representatives in planning and carrying out demonstrations on tillage, liming, and fertilization of farm soils. Assistance was rendered in organizing and carrying out educational programs at two Grassland Days as well as at a number of other Field Days and exhibitions. A pasture improvement contest was conducted in Oxford County with 23 farms entered, and a Farm Soil Productivity contest with 29 entries was carried out in Halton County.

Farm Planning Service

Detailed farm plans were worked out for 20 additional farms covering 3,300 acres. The main purpose of such plans is to provide a cropping system for optimum production of well adapted crops including a similar acreage of each crop each successive year. At the same time the objective is to maintain or increase soil productivity and minimize losses of soil by erosion. Advice and services were also given in connection with farms planned in previous years. Of the 65 farm plans covering 11,150 acres for which plans have been made since 1946, approximately 70 per cent are either in complete operation or are proceeding in that direction. Other plans have been partially adopted. Soil erosion is a pressing problem on most of the farms for which such plans are requested. Adjustments in the crop rotation to permit regular use of sod crops, improvements in fertility, and the introduction of strip cropping and grassed waterways are features included to meet such situations. Studies on the run-off plots on the Waterloo County soil erosion control field were continued with results similar to those previously reported.

Liming Materials

Thirty-five limestone samples submitted by quarry operators and farmers were analysed for calcium carbonate equivalent and screen tested to determine their qualifications for the limestone subvention policy.

Laboratory and Field Experiments

A field plot experiment on Guelph loam, designed to study residual effects of fertilizers as indicated by crop yields and uptake of elements throughout the rotation, was continued. Drought appeared to be the limiting factor in 1949 since no differences in crop yield or composition due to treatment could be detected.

A field experiment on Dumfries loam was undertaken to calibrate and correlate rapid methods for soil and tissue analyses, with crop response to applied fertility. Drought affected these plots also and introduced sufficient variation to make insignificant any response to treatment.

Co-operative research with the Legume Seed Setting Committee was continued in an attempt to delimit those soil properties that affect legume seed setting. From the year's results soil moisture appeared to be a limiting factor for adequate plant growth.

Co-operative research with the Potato Scab Committee was continued to evaluate soil characteristics that may influence the incidence of scab. Significantly lower scab infections were observed on the acid and alkaline soils than on the slightly acid soils. In contrast to the observations of the previous year the higher the organic matter contact of the soil the greater the incidence of scab. Such paradoxical results suggest an indirect effect of organic matter on scab prevalence, the nature of which is conditioned by the season.

To study the possibility of utilizing autumn leaves as a source of organic material on farm land, fresh autumn leaves and nitrogen were applied on field plots in a factorial experiment in the fall of 1949.

Physical measurements were made in the laboratory to estimate the effects of different tillage implements used on two soil types under various cropping systems. Preliminary indications were that water stable soil aggregates are

affected more rapidly by soil management than volume weight or porosity of the soil. As the rotations were initiated only in the spring of 1949 no differences between treatments were expected.

Greenhouse and laboratory studies of soil factors relating to emergence of brome grass seedlings were initiated. Soil moisture, texture, and volume weight appeared to affect the most desirable depth of seeding. Plans were made for further investigations under field conditions.

A study of the relative response to applied fertility on samples of topsoil representing major soil types was begun in the greenhouse. These studies are still in progress.

In a survey of some sweet clover fields the good stands were invariably found where they were well supplied with available calcium and magnesium.

F. A. STINSON,
Head of Department.

LIBRARY

The circulation of books during 1949-50 shows an increase of 1.8 per student over that of the previous year. The total number of books borrowed from the library was 10,593. There were 679 books added during the year making 48,956 volumes now in the library. A union list of the periodicals currently received in the libraries of the Ontario Agricultural College, the Ontario Veterinary College, and Macdonald Institute has been completed. This list includes 615 titles.

F. G. PARTRIDGE,
Head of Department.

DEPARTMENT OF PHYSICAL EDUCATION

Intercollegiate Activities and Championships

Intercollegiate competition was provided the students of O.A.C.-O.V.C. in the following sports — rugby, soccer, track and field, harriers, tennis, golf, badminton, boxing, wrestling, fencing, basketball, and hockey. The women's intercollegiate program included archery, basketball, volleyball, swimming, and badminton.

Intercollegiate teams were successful in winning the following championships:

Rugby	— Intermediate Intercollegiate Championship
Fencing	— Intermediate Intercollegiate Championship
Wrestling	— Three Senior Intercollegiate Championships One Intermediate Intercollegiate Championship
Boxing	— Three Intermediate Intercollegiate Championships
Archery	— Women's Intercollegiate Championship

Intramural Activities

Intramural competition was provided in the following sports: rugby, soccer, track and field, softball, harriers, tennis, golf, badminton, boxing, wrestling, fencing, basketball, volleyball, hockey, table tennis, curling, archery, rifle shooting, swimming, and horseshoes.

Over 80 per cent of the students in the first and second year took part in some form of intercollegiate or intramural sport as part of their required Physical Education. Special classes were given in the gymnasium for those who did not take an active part in the intramural program.

Other Activities

The members of the Department assisted in conducting the Field Days held on the campus during the summer months, and co-operated with the Department of Education in its summer school in Physical Education.

A special coaches course was provided during the Christmas Short Course, and instruction was given in archery, rifle shooting, swimming, boxing, wrestling, and fencing as part of the evening program.

Members of the Department were responsible for the sports program at the three Junior Farmer Camps held during the summer of 1949.

W. F. MITCHELL,
Head of Department.

DEPARTMENT OF PUBLIC RELATIONS

Publicity

One hundred and twenty-eight papers and 40 radio stations received 120 news releases, of which 20 were illustrated. O.V.C.-O.A.C. Faculty members prepared 54 special illustrated articles for several newspapers. Assistance was given press reporters who visited the College writing up special features. The Director and his staff were guest speakers at 30 agricultural dinners. During the year eight issues of the Alumni Activities were produced and circularized to the entire Alumni list, including the story of the Seventy-fifth Anniversary of the founding of the College. Alumni Membership increased from 670 to 1,000.

Photographic Extension Service

The following material was produced and used mainly for bulletins, publicity, teaching, research and extension work: black and white prints, 8,295; black and white slides, 348; coloured slides, 770; 16mm Film, 3,800 feet; 20 sets of 2 x 2 B & W slides (750); 10 sets of 2 x 2 colour slides (630); 41—4 x 5 ektachrome negatives.

Film Extension Service

1. The O.A.C. Film Library provided films for 335,458 people.

2. National Film Board Rural Circuits supervised programs for 487,081 people.

The Film Extension service has just experienced the busiest term of its six-year history. The present library now lists 735 film titles, 93 per cent of which are sound films. They also list 33 sets of coloured slides on various agricultural subjects which have been provided by the Ontario Agricultural College Photo Extension Service. Its files also include 78 film strips on a fairly broad subject coverage. The O.A.C. theatre, attached to the Film Extension Service, has presented 203 programs for professors before 6,890 students during the past term. Approximately 392 calls have been answered for equipment and films for the Agricultural Representative Service, Federation of Agriculture, and affiliated agricultural organizations. An interesting feature this year was an experiment which enabled one department to relate films to most of its course of study. Student response was excellent.

Exhibit Extension Service

This division has assisted every department on the campus, some local Crop Improvement Associations, other departments in Agriculture, and student activities, with the production of more than 1,500 linear feet of exhibits shown at 44 shows, and displayed for 169 days.

Dean and Student Counsellor

Accommodation — Nine hundred students were housed in double-deckers in the Administration Building — (3rd and 4th floors), in Bursar Hall, and the Horticultural Building. About 4,000 conference people were accommodated in residences.

Counselling — Six hundred students were interviewed: freshmen for orientation; sophomores for option; seniors for employment.

Employment — Jobs were found to be scarcer for graduates and more plentiful for undergraduates as there was an over supply of summer jobs.

Packet Loan Library

Women's Institutes, Farm Forums, Junior Farmers, Church and School Groups, and students of the Ontario Veterinary College and Ontario Agricultural College have borrowed 2,985 speeches, 379 debates, and 293 plays.

Housing Registry

There were 51 married students and 15 single students' names on file for accommodation; 62 were accommodated. Accommodation was also provided for 171 short course students and 10 post-graduate students. A total of 243 persons was accommodated.

Winter Short Course

The Department was in charge of the Annual Winter Short Course which was attended by 710 students from January 2nd to 6th, 1950.

Visiting Groups

Accommodation, meals, meeting rooms, tours, etc., were arranged for 74 groups, totalling 36,969 people.

W. D. TOLTON,

Head of Department.

MACDONALD INSTITUTE

Registration and Scholarships

Classes commenced at Macdonald Institute on September 22, 1949, with 71 students enrolled in the Diploma Course, 31 in the first year degree and 25 in the second year degree. Withdrawals and failures left 61, 27, and 24 respectively, in the above courses at the end of the term. It is expected that some 50 additional students may be accommodated when the Watson Hall residence is taken over and third year degree work is begun.

For the second time the Federated Women's Institute of Ontario Scholarships have been awarded. Five students in the first year degree course each received a One Hundred Dollar scholarship, awarded on the basis of their standing in their high school course work. These students, all from Ontario, were M. Yvonne Bailie, Mitchell; Anna S. Creed, Stoney Creek; Frances I. Gosnell, Highgate; Margaret J. Hamilton, Guelph; H. Lorraine Harding, Kitchener.

The Katharine T. Fuller Award of Thirty-five Dollars for a worthy student in second or third year of the degree course was awarded to Jean M. Davis of Napanee by the Macdonald Alumnae.

Degree Course Work

The Household Science Committee of the Senate of the University of Toronto, meeting on April 14, 1950, passed our proposed degree course work as it was presented for 1950-51.

Extension Work

There have been many calls by the public on our Institute staff in various forms. Exhibits, demonstrations, and programs were prepared for Farm and Home week and for the Holiday Week of the Women's Institute; a tour of buildings and a reception was held for the Provincial Program Competition for Girls, under direction of the Women's Institute Branch, in the fall; some judging work and lectures by staff were undertaken throughout the year in the wide field of home economics including foods and nutrition, clothing and textiles, family relations, interior decoration and home planning, the profession of home economics — the director having a particularly busy speaking program in explanation of the new degree course; two hundred and twenty-eight requests for information and loan material were answered; and many groups totalling about fifteen hundred people toured Macdonald Institute and Hall. Many of these were high school students, their teachers, and home economics women from across Canada, all anxious to learn the type of course work offered and to see our development to accommodate this work.

MARGARET S. McCREADY,

Head of Department.

FACULTY OF INSTRUCTION, RESEARCH AND EXTENSION

DEPARTMENT OF AGRICULTURAL ECONOMICS

W. M. DRUMMOND, B.A., M.A.—Professor and Head of the Department.
H. K. LECKIE, B.A., M.A.—Professor.
C. W. RILEY, B.S.A., M.S.A.—Professor.
M. W. FARRELL, B.A., M.A., Ph.D.—Associate Professor.
N. H. HIGH, B.S.A., M.S., Ph.D.—Associate Professor.
S. H. LANE, B.S.A., M.Sc.—Associate Professor.
A. C. ROBERTSON, B.S.A.—Assistant in Extension.

DEPARTMENT OF AGRICULTURAL ENGINEERING

C. G. E. DOWNING, B.E., M.Sc., M.E.I.C.—Professor and Head of the Department.
F. L. FERGUSON, B.S.A.—Professor.
E. GEORGE WEBB, B.S.A.—Associate Professor.
J. R. SCOTT, B.S.A.—Associate Professor.
H. W. KITCHING, B.S.A.—Assistant Professor
R. A. S. MOSS, M.A., A.F., R.Ae.S.—Assistant Professor.
W. P. SHOREY, B.S.A.—Drainage Supervisor.
J. A. MCKAY, B.S.A.—Drainage Supervisor.
W. E. GOODWINS—Technical Instructor.
K. N. GORDON—Technical Instructor.
J. H. GULLIVER—Technical Instructor.
D. J. JACKSON—Technical Instructor.
J. N. KUENZIG—Technical Instructor.
F. R. HORE, B.S.A.—Drainage Supervisor.
E. W. WALPOLE, B.S.A.—Instructor and Fieldman.

DEPARTMENT OF ANIMAL HUSBANDRY

R. G. KNOX, B.S.A.—Professor and Head of the Department.
G. E. RAITHBY, B.S.A.—Professor and Assistant Head of Department.
A. D. RUNIONS, B.S.A.—Professor.
E. C. STILLWELL, B.S.A. M.S.—Professor.
M. W. STAPLES, B.S.A., M.S.—Associate Professor.
W. O. KENNEDY, B.S.A.—Associate Professor.
R. P. FORSHAW, B.A., M.Sc.—Associate Professor.
T. D. BURGESS, B.S.A.—Instructor.

DEPARTMENT OF ANIMAL NUTRITION

H. D. BRANION, B.A., M.A., Ph.D., F.C.I.C., O.O.-N.—Professor and Head of the Department.
D. C. HILL, B.S.A., M.S.A., Ph.D., M.C.I.C.—Professor.
I. MOTZOK, B.S.A. M.S.A., Ph.D.—Professor.

DEPARTMENT OF APICULTURE

G. F. TOWNSEND, B.S.A., M.S.A.—Professor, Head of the Department, and Provincial Apiarist.
P. W. BURKE, B.S.A.—Lecturer and Assistant Provincial Apiarist.
M. V. SMITH, B.S.A.—Lecturer.

DEPARTMENT OF BACTERIOLOGY

E. H. GARRARD, B.S.A., M.S.A.—Professor and Head of the Department.
A. T. DAVEY, B.S.A.—Professor.
F. E. CHASE, B.S.A., M.S.A.—Associate Professor.
L. A. MCDERMOTT, B.S.A., M.S.A.—Associate Professor.
M. L. WRIGHT, B.S.A., M.S.A., C.S.I. (C)—Associate Professor.
D. B. SHUTT, B.S.A., C.S.I. (C), F.A.A.A.S.—Associate Professor.
W. H. BURTON, B.S.A.—Assistant Professor.

J. W. Connor, B.S.A., M.S.A., C.S.I. (C)—Lecturer.
J. A. Carpenter, B.S.A., M.S.A.—Lecturer.
R. A. Johnston, B.S.A., M.S.A.—Lecturer.
F. H. S. Newbould, B.S.A.—Assistant in Extension.
J. D. Cunningham, B.S.A.—Assistant in Extension.
G. W. Anderson, B.S.A., M.Sc.—Assistant in Research.
Margaret M. Hauser, B.S.A., M.S.A.—Laboratory Assistant.
Norma M. Stapleton, B.S.A.—Research Fellow.
I. L. Stevenson, B.S.A.—Research Fellow.

DEPARTMENT OF BOTANY

J. D. MacLachlan, B.A., A.M., Ph.D.—Professor and Head of the Department.
D. R. Sands, B.S.A., M.S.—Professor.
R. O. Bibbey, B.S.A., M.Sc., Ph.D.—Professor.
W. G. Evans, B.S.A., M.S.—Professor.
S. A. Simmons, B.S.A., M.A.—Assistant Professor.
F. H. Montgomery, M.A.—Associate Professor.
A. A. Wellwood, B.A., B.Sc.—Associate Professor.
R. T. Riddell, B.A.—Assistant Professor.
L. V. Busch, B.S.A.—Lecturer.
J. D. Gilpatrick, B.Sc., M.Sc.—Lecturer.

DEPARTMENT OF CHEMISTRY

R. S. Brown, M.A., Ph.D.—Professor and Head of the Department.
L. R. Bryant, M.A., F.C.I.C.—Professor and Dairy Chemist.
L. A. Birk, B.S.A., M.S., F.C.I.C.—Associate Professor.
D. MacDougall, B.A., M.Sc., Ph.D.—Associate Professor.
D. Waghorne, B.S.A.—Assistant Professor.
W. H. Brown, M.A., M.C.I.C.—Assistant Professor (On leave of absence).
J. R. Rothwell, B.S.A., M.C.I.C.—Assistant Professor.
S. J. Viron, B.A., M.A.—Lecturer.
F. E. Roadhouse, B.S.A.—Instructor.
D. A. Biggs, B.Sc.—Instructor.
Mary K. Hansuld, B.Sc.—Instructor.
D. G. Figgins, B.S.A.—Instructor.
K. Monica Lawless, B.A.—Instructor.
D. M. Moffatt, B.S.A.—Instructor.

DEPARTMENT OF DAIRYING

W. H. Sproule, B.S.A.—Professor and Head of the Department.
F. W. Hamilton, B.S.A.—Associate Professor.
H. A. Smallfield, B.S.A., M.S.—Associate Professor.
O. R. Irvine, B.S.A., M.S.A.—Associate Professor.
A. G. Leggatt, B.S.A., M.S.A.—Assistant in Research.
A. M. Pearson, B.S.A., M.S.—Lecturer.
J. C. Palmer, B.S.A.—Instructor, Dairy School.

DEPARTMENT OF ENGLISH

G. E. Reaman, B.A., M.A., B.Paed., Ph.D., F.A.G.S.—Professor and Head of the Department.
E. C. McLean, B.A., M.A.—Professor.
V. C. Lowell, B.S.A.—Assistant Professor.
W. Carpenter, B.A., M.A.—Assistant Professor.
D. A. Riggs, B.A.—Lecturer.
M. A. King, B.A.—Lecturer.
G. L. Warlow, B.S.A., M.A.—Lecturer.

DEPARTMENT OF ENTOMOLOGY AND ZOOLOGY

A. W. Baker, B.S.A.—Professor and Head of the Department.
R. H. Ozburn, B.S.A., M.S.—Professor.

H. W. Goble, B.S.A., M.S.—Professor and Provincial Entomologist.
J. G. Oughton, B.A., Ph.D.—Professor.
A. G. McNally, B.A., M.A.—Associate Professor.
A. J. Musgrave, B.Sc., M.Sc., A.R.C.S., D.I.C.—Assistant Professor.
W. C. Allan, B.S.A.—Lecturer.
W. E. Heming, B.S.A., Ph.D.—Associate Professor.
Shirley J. Kennedy, B.S., M.A.—Instructor.
R. Dyck, B.A.—Instructor.
S. E. Dixon, B.A.—Instructor.
Dorothy June Peers, B.S.—Instructor.

DEPARTMENT OF FIELD HUSBANDRY

G. P. McRostie, B.S.A., M.S.A., Ph.D.—Professor and Head of the Department.
O. M. McConkey, B.S.A., M.S., Ph.D.—Professor.
J. Laughland, B.S.A.—Professor.
J. R. Weir, B.S.A., M.Sc., Ph.D.—Professor.
R. Keegan, B.S.A.—Associate Professor.
D. N. Huntley, B.S.A., M.S.A., Ph.D.—Lecturer.
I. M. Roberts, B.S.A., M.S.A.—Research Fellow.
K. K. Bragg, B.S.A.—Research Fellow.
K. T. Grant, B.S.A.—Research Fellow.
R. S. Fulkerson, B.S.A.—Assistant in Research.
W. E. Tossell, B.S.A., M.S.A.—Lecturer.
R. E. Wight, B.S.A.—Research Fellow.
*W. L. S. Kemp, B.S.A., M.S.A.—Supervising Inspector, Potato Certification.
*N. R. Thompson, B.S.A.—Lecturer (O.A.C. part time), and Potato Investigations.
*E. K. Pearson, B.S.A.—Potato Certification Inspector.
* Dominion Department of Agriculture.

DEPARTMENT OF HORTICULTURE

J. S. Shoemaker, B.S.A., M.Sc., Ph.D.—Professor and Head of the Department.
T. O. Graham, B.S.A., M.S.—Professor.
R. Goodwin-Wilson, B.S.A.—Associate Professor.
T. H. Jones, B.S.A.—Assistant Professor.
E. W. Franklin, B.S.A., M.S.A.—Assistant Professor.
J. A. Weall—Lecturer.
C. C. Filman, B.S.A., M.Sc.—Lecturer.
J. C. Taylor—Technical Instructor.
B. J. E. Teskey, B.S.A.—Lecturer.
H. W. Bailey, B.S.A.—Assistant in Research.
Louise W. Heringa—Instructor.
*I. C. Marritt, B.Sc.F.— Lecturer in Forestry.
**J. H. L. Truscott, B.Sc., M.Sc., Ph.D.—Graduate Studies.
* By courtesy of the Ontario Forestry Branch.
** By courtesy of the Horticultural Experiment Station, Vineland.

DEPARTMENT OF PHYSICS

R. C. Moffatt, B.A., M.A.—Professor and Head of the Department.
J. G. F. Morton, B.Sc.—Associate Professor.
E. B. MacNaughton, B.A., M.A., Ph.D.—Associate Professor.
P. F. Clarke, B.A.Sc.—Assistant Professor.
J. G. Smith, B.S.A.—Instructor.
R. D. Graham, B.S.A.—Instructor.

DEPARTMENT OF POULTRY HUSBANDRY

J. R. Cavers, B.S.A., M.S.—Professor and Head of the Department.
E. S. Snyder, B.S.A., M.S.—Professor.
J. F. Francis, B.S.A.—Professor.
S. J. Slinger, B.S.A., M.S.A.—Professor.
J. E. Bergey, B.S.A.—Associate Professor.

J. H. Pettitt, B.S.A.—Associate Professor.
C. M. Huntsman, B.S.A.—Assistant Professor.
F. N. Jerome, B.S.A., M.S.A.—Assistant Professor.
A. E. Ferguson, B.S.A.—Assistant in Extension.
C. C. Duncan, B.S.A.—Assistant in Extension.
A. M. Morphet, B.S.A.—Assistant in Research.
J. D. McConachie, B.S.A.—Assistant in Extension.
J. P. Walker, B.S.A.—Assistant in Extension.
K. M. Gartley, B.S.A.—Assistant in Research.
W. F. Pepper, B.S.A.—Assistant in Extension.
H. L. Orr, B.S.A.—Instructor.
W. L. Anderson, B.S.A.—Assistant in Extension.

DEPARTMENT OF SOILS

F. A. Stinson, B.S.A., M.S.A., Ph.D.—Professor and Head of the Department.
F. F. Morwick, B.S.A., M.S.A., F.C.I.C.—Associate Professor.
N. J. Thomas, B.S.A., M.Sc.—Soil Specialist.
R. J. Bryden, B.S.A.—Associate in Extension.
T. J. Heeg, B.S.A., M.S.A., F.C.I.C.—Assistant in Research.
W. T. Ewen, B.S.A., M.S.A.—Assistant in Research.
L. R. Webber, B.S.A., M.S.—Soil Specialist.
A. L. Willis, B.S.A., M.S., Ph.D.—Assistant Professor.
J. W. Ketcheson, B.S.A.—Soil Specialist. (On leave of absence).
A. G. Caldwell, B.S.A., M.S.A.—Soil Specialist. (On leave of absence).
R. R. Bruce, B.S.A.—Soil Specialist. (On leave of absence).
B. C. Matthews, B.S.A., M.S.—Lecturer.
J. A. Shivas, B.S.A., M.S.A.—Assistant in Research.
G. Baker, B.S.A.—Soil Specialist.
T. H. Lane, B.S.A.—Research Fellow.
*J. M. Elliott, B.S.A.—Research Fellow.
*J. A. Smith, B.S.A.—Research Fellow.
*N. R. Richards, B.S.A., M.Sc.—Senior Pedologist.
*J. E. Gillespie, B.S.A.—Junior Pedologist.
**D. W. Hoffman, B.S.A.—Junior Pedologist.
**A. B. Olding, B.S.A.—Junior Pedologist.

* Dominion Department of Agriculture.
** Special Funds.

TRENT INSTITUTE

W. Rushton—Instructor in Bread Making.

BURSAR'S OFFICE

L. Z. O'Neill—Acting Bursar.
R. D. Fowke—Principal Clerk.
W. J. Precious—Senior Clerk.
G. Rose Bechtel—Clerk.
O. M. Atkinson—Clerk.
F. E. Nairn—Clerk.
W. J. King—Clerk.

GRADUATE STUDIES

G. H. Ruhnke, B.S.A., M.S.A., F.C.I.C.—Director of Research, Ontario Department of Agriculture and Chairman, Committee on Graduate Studies at the Ontario Agricultural College.

LIBRARY

Florence G. Partridge, B.H.Sc., B.L.S.—Librarian.
Mary K. Macdonald—Assistant Librarian.

DEPARTMENT OF PHYSICAL EDUCATION

W. F. Mitchell, B.S.A.—Supervisor.
J. T. A. Burnett, B.S.A.—Assistant Supervisor.

DEPARTMENT OF PUBLIC RELATIONS

W. D. Tolton, B.S.A.—Director.
H. G. Bell, B.S.A., F.C.I.C.—Director of Publicity.
J. A. Eccles, B.S.A.—Dean of Men and Students' Counsellor.
R. H. Ellis, B.S.A.—Assistant.
A. E. Fahl, B.S.A.—Assistant.
H. W. Pettipiere, B.S.A.—Assistant.
*L. A. Johnson—Senior Asisstant Supervisor.
*A. J. Peppin, B.S.A.—Assistant Supervisor.
* National Film Board, Ottawa, Ontario.

MILITARY TRAINING

Lieutenant-Colonel A. G. MacNally—Officer Commanding, Ontario Agricultural College Contingent, Canadian Officers' Training Corps.

Major K. W. Rutherford, Resident Staff Officer, Ontario Agricultural College Contingent, Canadian Officers' Training Corps.

Lieutenant J. A. Carpenter, (S.B.)—Officer Commanding, Ontario Agricultural College University Naval Training Division.

DIVISION OF HOME ECONOMICS

Margaret S. McCready, B.A., Ph.D.—Director of the Division.
Jessie M. Lambden, B.A., M.S.—Assistant Professor.
Edyth L. Bray, B.H.Sc., M.S.—Assistant Professor.
Louisa E. Brill, B.A.—Lecturer.
E. Jean Vance, B.A.—Lecturer.
Evelyn B. Stevenson, B.Sc.—Lecturer.
Mary E. Robinson (Mrs. J. I.), B.A.—Instructor.
Mrs. A. E. Barber—Dean of Women.

ONTARIO VETERINARY COLLEGE

A. L. MacNabb, V.S. D.V.Sc.—Principal of the Ontario Veterinary College.
F. J. Cote, D.V.M.—Registrar.
W. J. Beaty—Bursar.
(The following members of the Faculty of the Ontario Veterinary College give instruction in certain subjects to students of the Ontario Agricultural College).
G. Cairns, D.V.M., M.R.C.V.S.—Equine Diseases.
C. A. V. Barker, D.V.M., M.Sc., C.S.I. (C)—Breeding Hygiene.
H. Downey, D.V.M.—Physiology.
J. S. Glover, V.S., D.V.M.—Poultry Diseases.
J. Henderson, D.V.M., M.S.—Veterinary Surgeon to the Ontario Agricultural College Farm.
H. T. Batt, D.V.Sc., M.V.Sc., M.Sc., Ph.D.—Physiology.
R. A. McIntosh, B.V.Sc., M.D.V.—Bovine Diseases.

REPORT OF REGISTRAR

SUMMARY OF ATTENDANCE

April 1st, 1949, to March 31st, 1950

Course in Agriculture		685
Special Students		1
One Year Diploma Course in Home Economics (Macdonald Institute)		71
Degree Course (Macdonald Institute)		56
DAIRY COURSES		
Three Months' Course, January 3rd to March 29th, 1950	51	
Ice Cream Courses, April 4th to 15th, 1949	34	
		85
POULTRY COURSES		
Poultry Short Course, January 3rd to 27th, 1950	18	
Egg Grading Course, December 5th to 10th, 1949	13	
Chick Sexing Course, November 28th to December 2nd, 1949	9	
		40
HORTICULTURE		
Course for Commercial Florists, July 18th to 20th, 1949	214	
Course for Commercial Nurserymen, Sept. 1st and 2nd, 1949	60	
School for Canners' Fieldmen, December 14th to 16th, 1949	110	
Course for Gladiolus Growers, January 5th, 1950	59	
Royal Canadian Golf Association Greenskeepers' School— March 20th to 22nd, 1950	94	
		537
MISCELLANEOUS		
Course for Dairy Herd Supervisors:		
First Course, April 25th to April 29th, 1949 — 13		
Second Course, May 23th to May 27th, 1949 — 10		
Third Course, Nov. 21st to Nov. 25th, 1949 — 5		
	28	
Mould Count School, August 9th to August 19th, 1949	21	
Drainage Course, January 16th to January 27th, 1950	36	
Plant Producers' School, January 5th to January 6th, 1950	61	
		146
SPECIAL COURSES		
Agricultural Economics, January 2nd to 6th, 1950	68	
Athletic Coaches	29	
Beekeeping	27	
Community Program	78	
Farm Mechanics	196	
Horticulture	45	
Live Stock, Soils and Crops	267	
		710
SUMMER COURSES FOR TEACHERS July 4th to August 5th, 1949		
Agriculture		
Elementary, Part I	13	
Elementary, Part II (No course 1949)	0	
Intermediate, Part I	16	
Intermediate, Part II	15	
Specialists (No course 1949)	0	
Farm Mechanics (No course 1949)	0	
Inspectors' Course	3	
Refresher Course for High School Teachers, July 27-29, 1950	50	
		97
TOTAL		2,428

ANALYSIS OF COLLEGE ROLL, 1949-50
(General Course in Agriculture)

FROM ONTARIO

Algoma	4	Kenora	1	Peterborough	13
Brant	3	Kent	17	Prescott	2
Bruce	14	Lambton	15	Prince Edward	6
Carleton	30	Lanark	3	Rainy River	1
Cochrane	1	Leeds	10	Renfrew	2
Dufferin	8	Lennox and Addington	2	Russell	0
Dundas	10	Lincoln	15	Simcoe	12
Durham	9	Manitoulin	0	Stormont	3
Elgin	11	Middlesex	31	Sudbury	4
Essex	27	Muskoka	2	Temiskaming	3
Frontenac	2	Nipissing	4	Thunder Bay	4
Glengarry	4	Northumberland	9	Victoria	5
Grenville	9	Norfolk	10	Waterloo	20
Grey	9	Ontario	11	Welland	11
Haldimand	15	Oxford	18	Wellington	61
Halton	24	Parry Sound	3	Wentworth	29
Hastings	7	Peel	17	York	94
Huron	12	Perth	10		

Total From Ontario 647

FROM OTHER PROVINCES OF THE DOMINION

Alberta	4	New Brunswick	1	Prince Edward Island	1
British Columbia	2	Newfoundland	1	Quebec	3
Manitoba	1	Nova Scotia	2	Saskatchewan	2

Total From Other Provinces 17

FROM OTHER COUNTRIES

British Guiana	1	Colombia	1	Scotland	2
British West Indies	2	England	5	U. S. A.	3
Central America	2	Holland	4	Wales	1

Total From Other Countries 21

Total 685

Age—The average age of students in 1949-50 was 21.96 years.
The oldest student was 37 years of age.

RELIGIONS

United Church	330	Hebrew	4
Church of England	138	Brethren in Christ	2
Presbyterian Church	82	Christadelphian	1
Roman Catholic Church	53	Congregational	1
Baptist Church	29	Dutch Reform	1
Lutheran Church	12	Evangelical	3
Greek Orthodox Church	2	Gospel Hall	1
Greek Catholic Church	2	Interdenominational	1
Latter Day Saints	3	Russian Orthodox	1
Mennonite	7	Standard Church of America	1
Methodist	2	Undenominational	2
Pentecostal	1	Unitarian	1
Plymouth Brethren	1	United Brethren in Christ	2
Quaker	2		

Total 685

DEGREES AND DIPLOMAS IN AGRICULTURE

The following students graduated in 1949 with the degree of Bachelor of Science in Agriculture (B.S.A.)

*Note: * Ex-Servicemen.*

AGRICULTURAL ECONOMICS OPTION

*Ball, A. G.	144 Eccles St., Ottawa, Ont.
*Belyea, C. R.	Box 4, Talbot St. E., Leamington, Ont.
*Craig, R. A.	25 Neywash St., Orillia, Ont.
Fricker, J. F.	Box 24, North Bay, Ont.
*Gibson, A. D.	86 Cheritan Ave., Toronto, Ont.
Gosnell, L. M.	R.R. No. 1, Highgate, Ont.
*Haslett, E. A.	R.R. No. 1, Bonarlaw, Ont.
Hunt, G. E.	R.R. No. 3, Grand Valley, Ont.
*Jaffray, W. M.	Stoney Creek, Ont.
McArthur, D. A.	R.R. No. 1, Collingwood, Ont.
McCormick, M. Veronica	R.R. No. 6, Trenton, Ont.
*Ness, A. K.	297 Beresford Ave., Toronto 9, Ont.
Noble, H. F.	St. James' Rectory, Caledon East, Ont.
*Packman, W. W.	98 Crichton St., Ottawa, Ont.
*Peck, R. W.	R.R. No. 1, Oakville, Ont.
*Pettipiere, H. W.	88 Marlow Ave., Toronto 6, Ont.
*Rattray, R. H.	34 Barnes St., St. Thomas, Ont.
*Ray, E. N.	223 Hospital St., Guelph, Ont.
*Riach, C. M.	R.R. No. 8, Woodstock, Ont.
*Rollason, C. R.	110 E. Amelia St., Fort William, Ont.
Shaw, H. R.	R.R. No. 2, Smiths Falls, Ont.
Tisdale, C. R.	Box 101, Bronte, Ont.
West, D. F.	50 The Kingsway, Toronto 9, Ont.
	(23)

AGRICULTURAL MECHANICS OPTION

*Allen, W. D.	R.R. No. 2, Mountain, Ont.
Anderson, G. A.	115 Cambridge St., Guelph, Ont.
Bennett, G. K.	R.R. No. 2, Kemptville, Ont.
*Brubaker, J. E.	R.R. No. 2, Beamsville, Ont.
*Carter, T. E.	R.R. No. 6, St. Thomas, Ont.
*Coleman, J. L.	R.R. No. 5, St. Thomas, Ont.
*Eichenberger, W. N.	R.R. No. 1, Wilton Grove, Ont.
Falconer, A. C.	Blyth, Ont.
*Fellows, W. S.	50 Mountain Rd., Grimsby, Ont.
*Ford, A. K.	469 Jefferson Blvd., Riverside, Ont.
*Freeman, N. E.	Battersea, Ont.
Gregg, R. G.	R.R. No. 3, Uxbridge, Ont.
*Hanus, R. F.	116 Roxborough St. W., Toronto, Ont.
*Hore, F. R.	Markham, Ont.
Johnson, F. X.	303 Woburn Ave., Toronto 12, Ont.
*Keith, D. M.	Main St., Sussex, New Brunswick
*Kennedy, K. M.	R.R. No. 5, Tara, Ont.
*Ker, E. A.	Fenwick, Ont.
Le Gresley, A. P. F.	R.R. No. 3, Newcastle, Ont.
*Love, A. W.	35 Robinson Ave., Guelph, Ont.
*Lowndes, J. A.	R.R. No. 1, Queensville, Ont.
*Proudfoot, D. E.	187 Lakeshore Rd., Toronto 14, Ont.
Randall, W. F. G.	466 Milverton Blvd., Toronto, Ont.
*Roemmele, F. W.	46 Allan Ave., Guelph, Ont.
Stocker, T. W.	Stirling, Ont.
*Walpole, E. W.	Eastdale P.O., Hamilton, Ont.
Watson, E. H.	1806 Mouland Ave., Niagara Falls, Ont.
*Watson, J. A.	Box 41, Blyth, Ont.
	(28)

ANIMAL HUSBANDRY OPTION

Adams, D. M.	62 Gilmour Ave., Toronto, Ont.
*Alloway, R. M.	478 Simcoe St. N., Oshawa, Ont
*Armstrong, H. T. B.	201 Powell Ave., Ottawa, Ont.
Baron, D. R.	540 Parkdale Ave., Ottawa, Ont.
*Barrett, H. B.	R.R. No. 2, Port Dover, Ont.
*Best, K. E.	R.R. No. 3, Brantford, Ont.
Black, W. D.	Allenford, Ont.
Burles, E. H.	Cowley, Alberta.
Carman, G. M.	R.R. No. 1, Picton, Ont.
Clutton, W. D.	R.R. No. 5, Goderich, Ont.
*Couse, J. H.	Streetsville, Ontario.
*Forsyth, R. A.	210, Woolwich St., Guelph, Ont.
Francis, J. A.	R.R. No. 3, Renfrew, Ont.
Gowman, S. R.	R.R. No. 1, St. George, Ont.
Graham, R. E.	R.R. No. 4, Smiths Falls, Ont.
*Hancock, J. A.	R.R. No. 3, Bowmanville, Ont.
Hanna, J. S. H.	R.R. No. 3, Holland Centre, Ont.
*Howell, W. E.	Box 8, Colborne, Ont.
Jackson, G. W.	R.R. No. 1, Downsview, Ont.
Jose, D. W.	Newcastle, Ontario
*Kennedy, K. B.	1226 King St. W., Hamilton, Ont.
Landon, A. T.	Box 215, Simcoe, Ont.
Lawson, W. R.	R.R. No. 2, Georgetown, Ont.
MacDonald, N. C.	R.R. No. 6, Owen Sound, Ont.
*Martin, K. D.	69-A Fairview Ave., Toronto, Ont.
*Millson, G. E.	R.R. No. 8, St. Marys, Ont.
*Mood, W.	Birdsall, Ont.
*Mumford, E. B.	Fairacres Farms, Hampton, Ont.
Murray, R. M.	R.R. No. 5, Brampton, Ont.
*McCarthy, B.	Lakefield, Ont.
*McConvey, T. G.	323 Armadale Ave., Toronto, Ont.
*McCullough, J. W.	Navan, Ont.
McIntyre, J. R.	R.R. No. 3, Burford, Ont.
*McQuay, D. W.	R.R. No. 1, Whitby, Ont.
McRae, A. M.	R.R. No. 3, Ayr, Ont.
*Richardson, T. B.	1715 Dufferin St., Toronto, Ont.
Shapton, W. C.	R.R. No. 1, Exeter, Ont.
Sheppard, H. J.	216 Keele St., Toronto, Ont.
Small, M. L.	R.R. No. 2, Alliston, Ont.
Speir, D. R.	R.R. No. 3, Brussels, Ont.
*Starr, E. A.	R.R. No. 1, Little Britain, Ont.
*Stephens, J. U.	Box 131, Campbellford, Ont.
*Sweiger, G. W.	R.R. No. 1, Chesley, Ont.
Thomas, R. W.	R.R. No. 1, Stouffville, Ont.
*Wilson, A. M.	Manor House, Rockcliffe, Ottawa, Ont.
*Wilson, A. R.	R.R. No. 4, Peterborough, Ont.
Wilson, F. O.	R.R. No. 1, Erin, Ont.

(47)

FIELD HUSBANDRY OPTION

*Allen, G.	Godfrey, Ont.
*Anderson, R. R.	R.R. No. 1, Bonarlaw, Ont.
Bell, R. E.	R.R. No. 1, Gilford, Ont.
*Donovan, L. S.	Ryerson, Sask.
*Frank, W. M.	R.R. No. 1, West Lorne, Ont.
*Gulliver, M. E.	R.R. No. 2, Leamington, Ont.
*Hay, J. R.	711 Sammon Ave., Toronto 6, Ont.
*Hodgins, V. E.	Clandeboye, Ont.

FIELD HUSBANDRY OPTION (continued)

Keegan, R. W.	71 Forbes Ave., Guelph, Ont.
*Kingsbury, C. H.	100-A Woolwich St., Guelph, Ont.
Knapp, Dorothy E.	R.R. No. 2, Galt, Ont.
*Leggett, J. A. B.	360 Bay St., Ottawa, Ont.
*Macdonald, N. H.	Apt. 7, 44 Macdonnell St., Guelph, Ont.
*Marritt, E. F.	Keswick, Ont.
Millette, J. F. G.	L'Orignal, Ont.
*Moore, A. A.	R.R. No. 1, Guelph, Ont.
*McGregor, H. E. L.	R.R. No. 1, Wallaceburg, Ont.
*Scarffe, C. E.	Abbey, Saskatchewan.
*Snow, W. W.	Box 150, Blenheim, Ont.
*Snyder, J. W.	331 King St., London, Ont.
*Stafford, K.	Branchton, Ont.
Welch, W. H.	Ridgetown, Ont.
Wight, R. E.	116 Belmont Ave., Ottawa, Ont.
Young, W. S.	Cochrane, Ont.

(24)

POULTRY OPTION

*Anderson, W. L.	R.R. No. 1, Keswick, Ont.
*Hunt, E. J.	Lakehurst, Ont.
Junkin, K. E.	R.R. No. 3, Fenelon Falls, Ont.
Loft, D. M.	R.R. No. 4. Thedford, Ont.
*MacNeil, J. I.	c/o N. J. MacNeil, 18 Milton St., Sydney, N.S.
Morrison, W. D.	Millgrove, Ont.
*Pollard, W. M.	R.R. No. 1, Blyth, Ont.
*Reinhart, B. S.	R.R. No. 1, West Montrose, Ont.

(8)

HORTICULTURE — Division I

*Atkin, D. E.	60 Talbot St. W., Leamington, Ont.
Endean, R. H.	14 Centre St. W., Richmond Hill, Ont.
Hancock, D. W.	R.R. No. 1, Cooksville, Ont.
*Hancock, M. L.	R.R. No. 1, Cooksville, Ont.
*Jordan, R. J.	17 Lincoln Ave., Toronto 9, Ont.
*McNinch, C. E.	Box 12, Grimsby Beach, Ont.
Pettit, D. W.	Wilsonville, Ont.
*Weir, F. J.	Omemee, Ont.

(8)

HORTICULTURE — Division II

Arkell, A. E. H.	R.R. No. 2, Grimsby, Ont.
Back, M. Elizabeth	R.R. No. 1, Delhi, Ont.
*Brown, J. F.	R.R. No. 3, Milton W., Ont.
*Collver, K. R.	R.R. No. 4, Simcoe, Ont.
Crozier, I. A. K.	15 Dunham Ave., Kitchener, Ont.
*Denholm, W. E. S.	Parry Sound, Ont.
Devins, W. J.	21 Wellington St. E., Box 422, Aurora, Ont.
*Findlay, H. M.	Box 273, Essex, Ont.
*Hamilton, D. C.	R.R. No. 1, Lewisville, Moncton, New Brunswick
*Henderson, H. G.	R.R. No. 6, Napanee, Ont.
*Howe, L. G.	118 Berry Rd., Humber Bay, Ont. (Toronto 14).
*Humphreys, P. L. A.	18 Hammersmith Ave., Toronto, Ont.
*Hunter, K. W.	R.R. No. 1, Keswick, Ont.
*Janzen, J.	R.R. No. 1, Blair, Ont.
*Jenken, T. L.	34 Yorkshire St. S., Guelph, Ont.
Johnson, J. R.	R.R. No. 2, Parkhill, Ont.
*Knox, J. E. M.	7 Graham Ave., Guelph, Ont.

Paquette, S. J.	Amherstburg, Ont.
Potter, W. V.	R.R. No. 1, Bridgetown, Nova Scotia.
*Powell, D. L.	Ridgetown, Ont.
Sanderson, N. D.	R.R. No. 7, London, Ont.
*Sanderson, R. D.	R.R. No. 7, London, Ont.
*Shepherd, D. E.	358 Fairview Blvd., Riverside, Ont.
*Stock, L. J.	R.R. No. 2, Clinton, Ont.
*Teskey, B. J. E.	29 Todd St., Galt, Ont.
*Whittamore, G. F.	R.R. No. 2, Maple, Ont.
*Williams, D. E.	207 Riverdale Ave., Ottawa, Ont.
Wilson, J. S.	175 Douglas Ave., Oakville, Ont.

(28)

AGRICULTURAL SCIENCE OPTION

Auckland, J. W.	Talbotville, Ont.
*Black, H. J.	R.R. No. 1, Forester's Falls, Ont.
*Campbell, W. I.	168 Briar Hill Ave., Toronto 12, Ont.
*Crewson, J. E. L.	Hickson, Ont.
*Fraser, R. A.	14 Simpson Ave., Toronto 6, Ont.
*Gage, R. S.	471 Athol St. E., Oshawa, Ont.
Gardiner, J. S.	Morewood, Ont.
*Garriock, R. N.	Box 54, Woodbridge, Ont.
*Graham, R. D.	R.R. No. 1, Arner, Ont.
*Stoner, J. K.	73 St. Germaine Ave., Toronto, Ont.

(10)

APICULTURE OPTION

Ciphery, C. D.	R.R. No. 1, Essex, Ont.
Robertson, D. R.	R.R. No. 2, Georgetown, Ont.
Salkeld, E. Helen	R.R. No. 1, Lucknow, Ont.

(3)

BACTERIOLOGY OPTION

*Angus, T. A.	219 St. Helens Ave, Toronto, Ont.
*Arbuckle, G. F.	R.R. No. 1, Coboconk, Ont.
*Baker, G.	c/o Arthur Baker, Stouffville, Ont.
*Bruce, C. B.	62 Belmont Ave., Ottawa, Ont.
*Coombs, H. T.	40 Granville Ave., Ottawa, Ont.
*Crober, G. B.	Morrisburg, Ont.
*Dies, W. P.	141 Waverley Rd., Toronto 8, Ont.
*Dooley, T. E.	65 Glenmount Park Rd., Toronto, Ont.
*Douglas, R. J.	375 Grange St., Guelph, Ont.
*Epps, N. A.	R.R. No. 1, Ancaster, Ont.
*Ferguson, W. E.	Jasper, Ont.
*Gardhouse, A. J.	832 Third Ave. W., Owen Sound, Ont.
Humphreys, T. W.	Apt. 6, 164 Park St. S., Hamilton, Ont.
*Leach, T. H.	Box 201, Dryden, Ont.
Magus, M.	R.R. No. 5, Dunnville, Ont.
*Miller, B. F.	1962 Corwin Ave., Niagara Falls, Ont.
*Mullan, M. W.	65 Frontenac St., Sherbrooke, P.Q.
*Murray, J. R.	119 Kingsmill Ave., Guelph, Ont.
*McConney, A. E.	275 Glencairn Ave., Toronto 12, Ont.
McCorquodale, D. B.	R.R. No. 3, Lakeside, Ont.
*McKeen, D. C.	285-10th St. W., Owen Sound, Ont.
*Nelson, R. N.	Blumenhof, Saskatchewan.
Parsons, R. H.	192 Pape Ave., Toronto, Ont.
*Patterson, R. C.	6 Springdale Blvd., Toronto 6, Ont.
*Potter, F. C.	1631 Hall Ave., Windsor, Ont.

BACTERIOLOGY OPTION (continued)

Stevenson, I. L.	18 Mountain St., Grimsby, Ont.
*Sullivan, H. E.	Box 191, Englehart, Ont.
*Taylor, R. B.	c/o Mrs. Don. Aberhart, Aberhart's Garage, Goderich, Ont.
*Tennant, R. D.	R.R. No. 5, Almonte, Ont.
*Ure, D. A.	R.R. No. 3, Maidstone, Ont.
	(30)

BOTANY OPTION

*Benedict, W. G.	236 Rankin Blvd., Windsor, Ont.
*Page, O. T.	52 Martha St., Burlington, Ont.
*Stearman, W. A.	R.R. No. 2, Uxbridge, Ont.
*Stevens, R. C.	3 Hardy St., Guelph, Ont.
	(4)

CHEMISTRY OPTION

Alexander, J. C.	R.R. No. 2, Georgetown, Ont.
Archibald, J. A.	513 Centre St., S. Whitby, Ont.
*Arthur, D.	18 Glasgow St. N., Guelph, Ont.
*Austin, G. H.	c/o R. Stickney, R.R. No. 3, Guelph, Ont.
*Barnard, C. H. S.	Winona, Ont.
Bolton, E. F.	Burleigh Falls, P.O., Ont.
Christner, W. C.	R.R. No. 2, Baden, Ont.
Clifford, W. S.	R.R. No. 1, Kingsville, Ont.
*Elliot, J. M.	R.R. No. 3, Teeswater, Ont.
*Gray, W. A.	R.R. No. 1, Courtright, Ont.
*Hunter, J. D.	Meadowvale, Ont.
*Johnson, W. E.	R.R. No. 3, Proton Station, Ont.
*Johnston, G. R.	6 Boult Ave., Guelph, Ont.
*Lane, T. H.	17 Allan Ave., Guelph, Ont.
*McElroy, H. M.	260 Dublin St., Guelph, Ont.
*Olding, A. B.	309 McLean St., New Glasgow, Nova Scotia.
Osadchuk, M.	R.R. No. 2, Newmarket, Ont.
*Rusnell, A. R.	Stouffville, Ont.
Sinclair, J. W.	R.R. No. 1, Hepworth, Ont.
*Smith, J. A.	12 Moore Ave., Guelph, Ont.
*Swackhamer, A. B.	Georgetown, Ont.
*White, W. A.	188 Booth St., Ottawa, Ont.
	(22)

DAIRY HUSBANDRY OPTION

*Arbuckle, H. M.	292 Royal Ave., Ottawa, Ont.
*Barlow, J. E. M.	Bower Hill, Woodstock, Ont.
*Cox, F. M.	Pakenham, Ont.
*Hanna, W. J.	R.R. No. 6, Brighton, Ont.
*Harkness, J. G.	R.R. No. 2, Glanworth, Ont.
*Holder, G. K.	80 Woolwich St., Guelph, Ont.
*Lindabury, R. E.	89 Government Rd., Toronto, Ont.
*McElroy, J. W.	36 Kathleen St., Guelph, Ont.
*Rennie, A. S.	27 College Ave. W., Guelph, Ont.
Roblin, S. C.	204 Henry St., Whitby, Ont.
*Sage, W. A.	c/o Dr. R. A. Williams, Thames St., Ingersoll, Ont.
Stinson, I. S.	St. Mary's, Ont.
*Watson, G. R.	42 Church St., Elmira, Ont.
*Wilford, C. B.	57 King St. E., Ingersoll, Ont.
	(14)

ENTOMOLOGY OPTION

*Begg, J. A.	Tiverton, Ont.
*Buckles, R. J.	Whitevale, Ont.
*Burrage, R. H.	R.R. No. 1, River Road, Hammond, B.C.
*Dever, D. A.	36 Hearn Ave., Guelph, Ont.
Doane, C. C.	Bradford, Ont.
Harcourt, D. G.	34 Ferndale Ave., Toronto, Ont.
*Howitt, A. J.	407 Water St., Guelph, Ont.
*Kirby, C. C. S.	Angus, Ont.
*Maybee, G. E.	Smithfield, Ont.
*Scott, C. B.	R.R. No. 2, Mono Centre, Ont.
*Sullivan, C. R.	Box 191, Englehart, Ont.
	(11)

Ex-Service	175
Others	85
Total	260

THE FOLLOWING STUDENTS RECEIVED THE ASSOCIATE DIPLOMA IN APRIL, 1949

Allardyce, H. J.	R.R. No. 1, Dundas, Ont.
Anderson, S. A.	R.R. No. 4. Stratford, Ont.
Barnet, W. A.	R.R. No. 2, Leamington, Ont.
Bell, C. A.	Pinkerton, Ont.
Benner, T. K.	R.R. No. 1, Aylmer, Ont.
Caldwell, W. J.	Box 38, Watford, Ont.
Cameron, E. K.	Ailsa Craig, Ont.
Cowan, B. T.	R.R. No. 1, Blytheswood, Ont.
Crunican, G. M.	R.R. No. 2, London, Ont.
Cumming, R. B.	Kinghaven Farms, King, Ont.
Ellsworth, K. F.	Ridgeway, Ont.
Emerson, N. W.	R.R. No. 1, Dunnville, Ont.
Freeman, T. I.	R.R. No. 3, Waterford, Ont.
Gaiser, M. J.	R.R. No. 2, Dashwood, Ont.
Given, G. M.	R.R. No. 4, Wiarton, Ont.
Harvey, B. M.	Waterdown, Ont.
Horrigan, V. J.	R.R. No. 3, Mount Forest, Ont.
Knight, T. S.	Ashburn, Ont.
MacKendrick, W. H. (Took Course 1925-27)	Lakeshore Rd. E., Oakville, Ont.
MacNally, R. E.	885 Forhan St., Wallaceburg, Ont.
Maw, J. H.	30 Ellis Ave., Windsor, Ont.
Mills, H. D.	R.R. No. 1, Dobbinton, Ont.
McConnell, W. D.	c/o Morley Beath, R.R. No. 2, Oshawa, Ont.
McEwan, Olive N.	F. W. Bray Ltd., 120 John St., Hamilton, Ont.
McMullin, C. D.	45 Ray Blvd., Port Arthur, Ont.
Notley, M. J.	Firethorn Farm, Ewhurst, Surrey, England.
Pate, J. W.	R.R. No. 6, Brantford, Ont.
Potts, A. G. A.	R.R. No. 3, Simcoe, Ont.
Rankin, J. H.	Box 481, St. Marys, Ont.
Ransom, J. B.	The Manse, R.R. No. 1, Belle River, Ont.
Reaume, G. J.	R.R. No. 2, Tilbury, Ont.
Romansky, A. G.	R.R. No. 1, Tilbury, Ont.
Rose, G. H.	R.R. No. 3, Niagara Falls, Ont.
Schlegel, W. H.	Haig Farm, R.R. No. 4, Thedford, Ont.
Scollie, R. F.	Stanley, Ont.

THOMSON, S. G., JR.	19 Dufferin Ave., Chatham, Ont.
TODD, G. A.	R.R. No. 1, Churchill, Ont.
WALLER, DORIS M.	R.R. No. 1, Glen Cross, Ont.
WELSTEAD, S. B.	R.R. No. 4, St. Catharines, Ont.
WHITE, D. C.	R.R. No. 1, Oshawa, Ont.
WHITE, D. E.	125 Ballantyne Ave, Stratford, Ont.
TOTAL	41

DAIRY SCHOOL DIPLOMAS ISSUED MARCH, 1950

ANDERSON, C. L.	Niagara Apts., St. Catharines, Ontario
BEELIK, A. V.	R.R. No. 3, Acton, Ontario.
BELL, F. L.	Milton, Ontario.
COUSINS, J. W.	11 Lawrence Ave., Weston, Ontario.
CRUNDWELL, A. I.	Box 504, Dresden, Ontario.
DAUNAIS, A. J.	5437 Bourbonniere St., Montreal, Quebec.
DE GRACE, G.	Campbellton, New Brunswick.
DI PERSIO, J. P.	Purves St., North Sydney, Nova Scotia.
EASTMAN, B. L.	Box 801, Petrolia, Ontario.
EMERSON, G. H.	32 Grant St., Stratford, Ontario.
FOREMAN, D. M.	56 Pine St., Port Hope, Ontario; (Dairy School 1944).
FOWLIE, A. C.	10 Suffolk St. W., Guelph, Ontario.
GUSTAR, W. B.	R.R. No. 3, Brampton, Ontario; (Dairy School 1949).
HARRY, G. C.	90 Dover Rd., Welland, Ontario.
HICKS, G. D.	Lewisville, New Brunswick.
HOFFMEYER, N. W.	Box 32, Mitchell, Ontario.
HOWARD, M. R.	52 Charles St. E., Toronto, Ontario.
HUTCHISON, J. W.	R.R. No. 2, Ingersoll, Ontario.
JOHANN, R. S.	Box 316, Teeswater, Ontario.
KEMP, R. E.	173 Locksley Ave., Toronto, Ontario.
KENNEDY, W. A.	103 Burris St., Hamilton, Ontario.
KREUTER, C. E.	Rostock, Ontario.
LE MON, L. J.	R.R. No. 3, Dundas, Ontario.
LEVIS, R.	2 Fernwood Gardens, Toronto, Ontario.
LINK, R. O.	R.R. No. 2, Cayuga, Ontario.
MACDONALD, G.	Box 365, Pictou, Nova Scotia.
MACKAY, D. G.	R.R. No. 2, Scotsburn, Nova Scotia.
MACKAY, J. V.	R.R. No. 2, Scotsburn, Nova Scotia.
MATIZ, H.	Bogota, Colombia, South America; (Dairy School 1949).
MEEK, J. W.	5735 Chabot St., Montreal, Quebec.
MORANDIN, GUIDO	152 Mountjoy St., Timmins, Ontario.
MCKEE, W. D.	Box 451, New Liskeard, Ontario.
MCKENZIE, H. T.	Mount Forest, Ontario.
PARKER, W. J.	Omemee, Ontario.
PEDDEN, D. I.	R.R. No. 6, Strathroy, Ontario.
RENWICK, D. H. G.	P.O. Box 129, St. Georges, Grenada, B.W.I.
ROSS, W. G.	New Liskeard, Ontario.
SIDEY, R. W.	40 Hollywood St., Hamilton, Ontario.
SINNOTT, O. A.	Bristol, Prince Edward Island.
THOMPSON, C. W.	Teeswater, Ontario.
TOOLE, J. E.	370 Briar Hill Ave., Toronto, Ontario.
TRAVIS, R. W.	Corinth, Ontario.
WADSWORTH, E. E.	Ingersoll, Ontario.
WELLS, J. A.	Shelburne, Ontario.
WETMORE, L. J.	Hampstead, Queens Co., New Brunswick.

WHELDON, A. M.	114 Glenelg St., Lindsay, Ontario.
YOUNG, W. R.	10 Hollis Ave., Toronto, Ont.
TOTAL	47 Diplomas

SCHOLARSHIPS, BURSARIES, PRIZES, MEDALS AND OTHER AWARDS, 1949-50

(Awarded in 1949 unless otherwise indicated)

(A) SCHOLARSHIPS AND BURSARIES

Barrie Board of Education Scholarship

($150.00 each year for the First and Second Years)

Awarded annually (if there are candidates) to a student from Barrie Area Collegiate as a scholarship for further study at the Ontario Agricultural College, the Ontario Veterinary College or Macdonald Institute—

John McLean, R.R. No. 1, Barrie, Ontario (First Year—Ontario Veterinary College).

Borden Dairy Scholarship

A scholarship of $200 awarded by the Borden Company of Canada, Limited, to the best "all round" student in the Dairy Option in the Third Year—

D. H. Bullock, Caledonia, Ontario (Fourth Year 1949-50).

Canadian Industries Limited Scholarship — $750.00

(Established in 1948 but first awarded in 1949)

This Scholarship, the gift of Canadian Industries Limited, of the value of $750.00 is established for the encouragement of Graduate work in Agricultural Chemistry—

1949-50 — G. H. Austin, B.S.A. 1949, R.R. No. 3, Guelph, Ontario.

The Class 1933 Scholarship — $200.00

The graduating class of 1933 offers the following annual Scholarship for graduate work:—

The Scholarship is awarded in honour of the late Professor W. J. Squirrell, formerly head of the Field Husbandry Department at the Ontario Agricultural College, and late Honorary President of Class 1933.

It is awarded to an outstanding student, consideration being given to extracurricular activities as well as high academic standing.

T. A. Angus, B.S.A. 1949, Bacteriology Dept., O.A.C., Guelph, Ontario.

County Scholarships — Winners — 1949-50

Scholarships of $100.00 each, awarded annually, by various counties, to outstanding young men and women in their counties who propose to enter the First Year at the Ontario Agricultural College or Macdonald Institute.

Bruce County

J. E. Whicher, R.R. No. 6, Wiarton, Ontario (First Year — Degree Course).

Bruce County Federation of Agriculture

J. W. Jacklin, R.R. No. 2, Elmwood, Ontario (First Year — Associate Course).

Haldimand County

M. D. L. Reid, R.R. No. 3, Hagersville, Ontario (First Year — Degree Course).

Huron County

J. W. Armstrong, R.R. No. 3, Brussels, Ontario (First Year — Degree Course).

Huron County Federation of Agriculture

E. H. Clutton, R.R. No. 5, Goderich, Ontario (First Year — Degree Course).

Norfolk County

J. O. Packard, 321 Main Street, Simcoe, Ontario (First Year — Degree Course).

Peterborough County — Two Scholarships of $100.00 each

No award 1949-50.

Wellington County

G. M. Coutts, R.R. No. 2, Conn, Ontario (First Year — Degree Course).

Wentworth County — Three Scholarships of $100.00 each

Agriculture

W. L. Gottfredsen, R.R. No. 2, Ancaster, Ontario (First Year — Degree Course). (This Scholarship was held over from 1947-48).

W. S. Marshall, R.R. No. 1, Caistor Centre, Ontario (First Year — Associate Course).

Home Economics

Kathleen M. Flatt, R.R. No. 2, Hamilton, Ontario (One Year Diploma Course).

Kent County Scholarship — $50.00

Offered by the Kent County Council for 1950 only to a Kent County student in the First Year of the Associate Class at the Ontario Agricultural College—

D. J. Purcell, Wardsville, Ontario.

Dominion-Provincial Student-Aid Bursaries 1949-1950

Awarded to worthy and needy students of high scholarship, on the recommendation of the Deputy Minister of Education of the Province of Ontario.

Type A — Ontario Agricultural College

First Year Degree Course

J. G. B. Cayen, 380 Laforest Ave., Sudbury, Ontario.
A. M. de Hueck, 3519 Lorne Ave., Montreal, P.Q.
F. E. Gillan, Pakenham, Ontario.
R. H. Stinson, R.R. No. 1, Keswick, Ontario.
W. H. Western, 158 Neeve St., Guelph, Ontario.

Type B

Second Year Degree Course

D. B. Emmons, R.R. No. 6, Dunnville, Ontario.
Erna L. Klassen, R.R. No. 2, Ruthven, Ontario.
R. E. Mills, 5 Home St., Guelph, Ontario.

Third Year Degree Course

J. G. T. Chillcott, 22 Dufferin Ave., Penetanguishene, Ontario.
D. A. Gendron, Church St., Penetanguishene, Ontario.
D. B. Wilson, R.R. No. 2, Stirling, Ontario.

Fourth Year Degree Course

R. A. Crawford, Allenford, Ontario.
K. R. Farrell, South Mountain, Ontario.
W. R. Garvie, Kilsyth, Ontario.
D. H. Jeffrey, R.R. No. 2, Belleville, Ontario.
G. K. Macleod, Alexandria, Ontario.
J. F. McAlpine, Maynooth, Ontario.

Macdonald Institute (Home Economics)

Type A

First Year Degree Course

Allison E. Bilton, R.R. No. 5, Hagersville, Ontario.
Mary A. Wodskou, R.R. No. 3, Hagersville, Ontario.

Type B

Second Year Degree Course

M. Jean Thomson, Fenelon Falls, Ontario.

The Robert Harcourt Bursaries

($75.00 per year for Third and Fourth Years)

Awarded annually in honour of the late Dr. Harcourt, Head of the Department of Chemistry from 1901-1936, to a worthy student in the Second Year of the Degree Course who proposes to enter the Chemistry Option—

1948-50—D. D. Dolson, R.R. No. 1, Melancthon, Ontario (Fourth Year 1949-50)
1949-51—K. M. King, Hickson, Ontario (Third Year 1949-50).

Leonard Foundation Scholarship 1948-50 — $200.00 per year

Awarded to deserving students to attend or who are attending Canadian Universities—
Margaret L. Fleming, 11 Drummond St., Perth, Ontario.
(Second Year Degree Course — Macdonald Institute).

Midland Scholarship
($100.00 each year for First and Second Years)

Awarded annually by the Midland Press (The Free Press-Herald) and the Midland Kiwanis Club to enable an outstanding student from the Midland District to attend the Two Year Associate Course at the Ontario Agricultural College.

First Winner — 1948-50

W. J. McClung, Phelpston, Ontario (Second Year — Associate Course).

No award 1949-51.

Nutrition Conference Scholarship
($150.00 annually)

This scholarship was established by the Ontario Division of the Canadian Feed Manufacturers' Association to assist a student in post-gratuate work in Animal Nutrition.

Joint Winners 1949-50

D. Arthur, B.S.A. '49, Animal Nutrition Department, O.A.C., Guelph, Ont.
J. C. Alexander, B.S.A. '49, Animal Nutrition Department, O.A.C., Guelph, Ont.

Ontario Women's Institutes Scholarships

Five scholarships of $100.00 each, awarded annually, by the Federated Women's Institutes of Ontario to outstanding High School graduates, to assist them to enter the First Year of the Degree Course in Home Economics at Macdonald Institute.

1949-50

M. Yvonne Bailie, Mitchell, Ontario.
Anna S. Creed, 84 King Street East, Stoney Creek, Ontario.
Frances I. Gosnell, R.R. No. 1, Highgate, Ontario.
Margaret J. Hamilton, 75 Oxford Street, Guelph, Ontario.
H. Lorraine Harding, 68 Glasgow Street, Kitchener, Ontario.

Thomas E. Wilson Scholarships

$75.00 per year for First and Second Years of the Degree Course. Donated annually by Thomas E. Wilson, who was born in London, Ontario, and who is prominent in the Meat Packing Industry in Chicago, Ill., U.S.A. Awarded to outstanding students from Secondard Schools in Middlesex County.

Second Year Degree Course Winners — 1948-50

James F. Davis, R.R. No. 7, London, Ontario (London Central Collegiate).
Sara Ann J. Harvey, 268 Queen's Ave., London, Ont. (London Central Collegiate).
D. M. Anderson, R.R. No. 2, London, Ontario (London Central Collegiate).

No awards for First Year for 1949-51.

(B) PRIZES

Canadian Weekly Newspapers Prize in Journalism — 1950

The Canadian Weekly Newspapers' Association offers an annual prize of $10.00 to be awarded each January to the member of the O.A.C. Review Staff, excluding the Editor, who, during his term of office has done the most valuable work for the Review.

A. R. Appleton, 46 McTague Street, Guelph, Ontario (Fourth Year, O.A.C.)

Chemical Institute of Canada Prize $25.00

Awarded annually to the student entering the Fourth Year of the Chemistry Option who has the highest standing in the examinations in subjects taken in the Departments of Chemistry and Physics—

D. D. Dolson, R.R. No. 1, Melancthon, Ontario (Fourth Year 1949-50).

The Class 1928 Prizes in Public Speaking — 1950

For the purpose of encouraging Public Speaking, the Class of 1928 offers prizes totalling fifty dollars ($50.00) annually.

First Prize—$20.00—
Miss Doris M. Klugman, 10 Gordon Ave., Kitchener, Ont. (Second Degree, O.A.C.)

Second Prize—$12.00—
G. F. Hood, Port Elgin, Ontario (Fourth Year, O.V.C.)

Third Prize—$8.00—
H. R. Baker, R.R. No. 2, Merrickville, Ontario (Fourth Year, O.A.C.)

Fourth Prize—$5.00—
G. A. Ionson, R.R. No. 1, Jarvis, Ontario (Fourth Year, O.A.C.)

Fifth Prize—$5.00—
W. A. S. Cromarty, R.R. No. 2, Dorchester, Ontario (Third Year, O.A.C.)

Bruce M. Cohoe Prizes — 1950

Awarded to the students in the First, Second and Third Years who stand highest in the Grain Judging Competitions held by the Department of Field Husbandry—

Class 1953—
($5.00)—J. M. Bennett, R.R. No. 2, Spencerville, Ontario.

Class 1952—Tied—
($2.50)—H. G. Norry, R.R. No. 1, Tilbury, Ontario.
($2.50)—I. A. White, 4 Valhalla Blvd., Toronto 13, Ontario.

Class 1951—Tied—
($2.50)—D. M. McAlpine, R.R. No. 5, Dutton, Ontario.
($2.50)—W. B. McFadzean, Box 243, Fergus, Ontario.

Grand Championship Trophy

(Silver Tray)

A. F. Henry, R.R. No. 2, Turnerville, Ontario (Third Year, O.A.C.)

FIRST YEAR PRIZES

Eight prizes of $25.00 each, awarded annually, to students in the First Year of the Degree and Associate Courses, for being highest in general proficiency in certain groups of subjects.

Degree Course
Group I —J. F. Davis, R.R. No. 7, London, Ontario.
Group II —H. G. Norry, R.R. No. 1, Tilbury, Ontario.
Group III—G. A. Preston, 94 Grosvenor Street, Hamilton, Ontario.
Group IV—E. E. Gamble, R.R. No. 2, Hespeler, Ontario.

Associate Course
Group I —D. C. Chadwick, Scarborough, Yorks., England.
Group II —J. J. Christensen, Morrisburg, Ontario.
Group III—D. M. C. McCallum, R.R. No. 1, Elmwood, Ontario.
Group IV—M. M. MacKinnon, R.R. No. 2, Bath, Ontario.

Katherine T. Fuller Award

$35.00 awarded annually to a worthy student in the Second or Third Years of the Degree Course in Home Economics, whose academic standing is above average—
Jean M. Davis, R.R. No. 2, Napanee, Ontario (Second Year).

General Proficiency Prize — First Two Years

Awarded annually to the student in the Second Year who stands highest in general proficiency in the first two years—
S. C. Stothers, Fergus, Ontario (Third Year 1949-50).

The John Goad Prize in Dramatics and Music — 1950

An annual prize of $15.00 is donated by John Goad, B.S.A. 1936, of Guelph, Ontario, to the student participating in the production of plays and operettas, who is considered by

the judges to have given the best performance or performances of the year. Previous winners of this award are not eligible.

A. R. Appleton, 46 McTague Street, Guelph, Ontario (Fourth Year, O.A.C.)

The Dr. W. R. Graham Prize

Awarded annually to a student in the First or Second Years of the Associate or Degree Courses who has been the outstanding student in the various courses and activities in the Department of Poultry Husbandry—

R. J. Steckle, R.R. No. 2, Kitchener, Ontario (Second Year Degree — 1949-50).

The John Sutherland, Sr., Memorial Prize in English — $20.00

Awarded annually to the student in the Second Year of the Degree Course who is highest in general proficiency in the work of the Department of English in the first two years—

J. G. T. Chillcott, 22 Dufferin Ave., Penetanguishene, Ont. (Third Year — 1949-50).

Ontario Veterinary College Prizes in Dramatics

In recognition of the valuable work being done by the Union Literary Society in Dramatics, and to encourage the maintenance of high standards in this work, the Ontario Veterinary College is providing the sum of Thirty Dollars ($30.00) annually for two equal prizes ($15.00 each) to be in accordance with the conditions set down below:

Acting Prize

An award of fifteen dollars will be paid to the student who has not previously acted in Union Literary Society productions whose achievement in acting is considered to be the best of the year—

Miss M. Esme Wood, 300 Laurier Ave., Quebec City, P.Q. (Second Year, O.V.C.)

Production Prize

An award of fifteen dollars will be paid to the student who is considered to have made the most valuable contribution to the dramatic work of the Society other than by acting—

F. B. Jasperson, Box 329, Kingsville, Ontario (Fourth Year, O.A.C.)

Ontario Wholesale Farm Equipment Association Prizes — $100.00 Each

Awarded, annually to students in the Third Year of the Ontario Agricultural College — Agricultural Mechanics Option:

No. 1 — To the student who has the most thorough working knowledge of the machinery used on Ontario farms—

V. R. Johnston, Newtonville, Ontario (Fourth Year — 1949-50).

No. 2 — To the best "all round" student in the Agricultural Mechanics Option in his Third Year—

R. W. Stephenson, 159 Wellington St., London, Ontario (Fourth Year — 1949-50).

Class 1905 Award — 1950
(Approximately $50.00)

Awarded annually to the best "all round" student in the Third Year—

C. M. Switzer, R.R. No. 2, Mount Brydges, Ontario.

Peterborough Rotary Club Prize in Public Speaking — $100.00

The Peterborough Rotary Club held a Peterborough County Public Speaking Contest in 1946 and offered a prize of $100.00 to the winner to assist him in entering the First Year in a University Course. The money was not to be paid until the winner entered a University.

Winner 1946

G. C. Clark, R.R. No. 2, Peterborough, Ontario (First Year Degree, O.A.C.)

Second Year Special Essay Prize — $10.00

Awarded to a student in the Second Year at the Ontario Agricultural College who presents the best Essay on one of a series of topics designated by the Department of English—

1950—Doris M. Klugman, 10 Gordon Ave., Kitchener, Ontario (Second Degree).

The Joseph Webb Prize in Agricultural Engineering — $12.50

Awarded annually to a student in the Second Year of the Degree Course who, at the end of his Second Year, has the most thorough working knowledge of the machinery used in the operation of an Ontario farm—

L. E. Coultis, R.R. No. 3, Exeter, Ontario (Third Year — 1949-50).

Prizes of the Minister of Switzerland in Canada

(Inaugurated in 1950)

The Minister of Switzerland in Canada offers annual prizes to students in our Third or Fourth Years, who have distinguished themselves in reading Scientific French.

The prizes will consist of a series of books, written by the best Swiss Authors of the French Language, or by some well known Foreign Authors who have written about Switzerland. The books will be selected each year by our Department of English, from a list submitted by the Swiss Minister.

The awards will be made by the Department of English.

H. F. Doseger, 116 Wellington Street., Hull, Quebec (Third Year, O.A.C.)
A. H. Beswick, 345 Clemow Ave., Ottawa, Ontario (Fourth Year, O.A.C.)

FOURTH YEAR AWARDS

Canadian Feed Manufacturers' Association Prize — $25.00

Awarded to the Fourth Year student who presents the best thesis relating to the subject of Animal Nutrition—

E. F. Marritt, B.S.A. '49, Keswick, Ontario.

C.F.R.B. Prizes in Radio Broadcasting

Offered by the Rogers Radio Broadcasting Company.

First —$15.00—M. W. Mullan, B.S.A. '49, R.R. No. 3, Guelph, Ontario.
Second—$10.00—C. R. Belyea, B.S.A. '49, Leamington, Ontario.

General Proficiency Prize — $10.00

Highest in General Proficiency in the Fourth Year.

R. J. Douglas, B.S.A. '49, 375 Grange Street, Guelph, Ontario.

F. Eric Millen Prize

Awarded to the student specializing in Apiculture, who secures the highest standing in his Fourth Year examinations.

E. Helen Salkeld, B.S.A., R.R. No. 1, Lucknow, Ontario.

Charles McGowan Award

This award is made to an outstanding Fourth Year student, consideration being given to academic proficency, participation in student activities, and ability to co-operate with students and faculty. Winners of previous major awards are not eligible for this award.

Joint Award

J. E. M. Barlow, B.S.A., '49, Woodstock, Ontario.
L. M. Gosnell, B.S.A. '49, R.R. No. 1, Highgate, Ontario.

Pioneer Feed Awards

Awards made by Purity Flour Mills to outstanding students in the Annual Husbandry Option, with particular reference to proficiency in Live Stock, Poultry and Nutritional Studies.

First —$75—G. M. Carman, B.S.A. '49, R.R. No. 1, Picton, Ontario.
Second—$50—A. M. McRae, B.S.A. '49, R.R. No. 3, Ayr, Ontario.
Third —$25—G. W. Jackson, B.S.A. '49, R.R. No 1, Downsview, Ontario.

Publishers' Prize in English — $25.00

Offered by McClelland and Stewart Limited, Toronto, in 1949.

Awarded to an outstanding student in English Literature, Public Speaking and in the work of the Literary, Dramatic or Philharmonic Societies or the O.A.C. Review.

T. A. Angus, B.S.A. '49—Bacteriology Department, O.A.C., Guelph, Ontario.

(C) MEDALS

J. M. Christie Gold Medal — 1950

Awarded to the student in the Dairy School who is highest in general proficiency.

G. H. Emerson, 32 Grant Street, Stratford, Ontario.

Class '19 Medals for Inter-Year Debating — 1950

The medals are donated by the graduating class of 1919 to the Union Literary Society, to be awarded to the team of four men who shall win the Inter-Year Debating Contest regularly conducted by the Literary Society during the Fall and Winter terms.

Winners 1950—Class 1950 (Fourth Year, Ontario Agricultural College).

E. T. Banting, Hazel Cliffe, Saskatchewan.

C. F. Campbell, 2279 Taylor Street, Niagara Falls, Ontario.

J. A. Carman, R.R. No. 1, Picton, Ontario.

A. J. Scott, 4 Victoria Street, Guelph, Ontario.

Captain E. T. Goring Shield — 1950

This trophy was donated by Captain E. T. Goring upon his vacating command of the O.A.C. Contingent, C.O.T.C. in 1933. The trophy, consisting of a silver copy of the official unit badge mounted on an attractive shield, to be awarded annually to the outstanding Section Commander for leadership.

Not awarded in 1950.

Governor General's Silver Medal

Awarded annually to the student in the Second Year who stands highest in general proficiency in the first two years.

S. C. Stothers (Third Year 1949-50) — Fergus, Ontario.

Knox Medal in Animal Husbandry — 1950

Highest in general proficiency in Animal Husbandry in the First Year.

J. M. Bennett (First Degree Class), R. R. No. 2, Spencerville, Ontario.

Lieutenant Governor's Medal

Awarded to the Fourth Year student who has been outstanding in all phases of the work of the Department of Animal Husbandry during his four years.

J. W. McCullough, Navan, Ontario.

Diarmid J. McTaggart Memorial Medal — 1950

Awarded to the student who secures the highest aggregate score in competitions held during the year by the Animal Husbandry Club.

D. G. Burke (Third Year), Hagersville, Ontario.

Students' Council Gold Medal — 1950

A gold medal awarded to the outstanding "all round" student at the conclusion of the second year of the Two Year Course.

D. M. C. McCallum, R.R. No. 1, Elmwood, Ontario.

(D) TROPHIES

Canada Packers' Trophy — 1950

A Silver cup presented annually to the outstanding "all round" showman at the College Royal Show.

J. Pos (Fourth Year — O.A.C.), 61 Stevenson St., Guelph, Ontario.

Jacobine Jones Trophy — 1950

Awarded to the "Grand Champion Showman" in the Live Stock Division at the College Royal Show.

S. MacDonald, (Fourth Year — O.A.C.), R.R. No. 1, Dalkeith, Ontario.

Quaker Oats Trophy — 1950

Awarded to the outstanding judge in the general judging competition in all classes at the College Royal Show.

N. M. Lee (Third Year — O.A.C.), R.R. No. 1, Winchester, Ontario.

Wade Toole Memorial Trophy — 1950

The outstanding exhibit of a student club or group at the Annual College Royal Show.

Agronomy Club.

Wildman Trophy — 1950

Awarded annually to the outstanding "all round" student in his Fourth Year who is a member of the Senior Rugby Team.

1949-50—J. M. Baker (Fourth Year O.V.C.), 3415 Shuter St., Montreal, P.Q.

Year '31 Trophy — 1950

Awarded to the Class winning the highest number of points in all competitions in the College Royal Show.

Fourth Year (Class 1950).

Year '43 Trophy — 1950

Awarded to the O.A.C. student who, at the conclusion of his third year, is considered by the committee of selection to have done the most valuable work in dramatics throughout the previous three years. (Acting, staging and executive activities may be considered in making the award.)

Not awarded 1950.

Year '45 Individual Athletic Trophy — 1950

The individual athletic award shall consist of a suitable athletic figure mounted upon a trinket box. The trophy is awarded annually at the same time as the Year '45 Inter-Year Athletic Trophy.

R. S. Butler, 784 Washburn Street, Winnipeg, Manitoba (First Year, O.V.C.)

Year '45 Inter-Year Athletic Trophy — 1950

The Year '45 Trophy is awarded annually at the Ontario Agricultural College or the Ontario Veterinary College to the year which has accumulated the highest aggregate points in inter-year athletic competition during the college year. The point system shall be that which is drawn up by the Department of Physical Education at the Ontario Agricultural College.

The trophy is presented at the Annual Athletic Banquet held in March each year.

Winner 1950 — Third Year O.A.C. (Class 1951).

The J. Lockie Wilson Memorial Trophy

This trophy has been donated by the organizations with which the late Mr. Wilson served, as Secretary, during his long term of office in the Ontario Department of Agriculture from 1907 to 1933:

Ontario Plowmen's Association; Ontario Association of Agricultural Societies; Ontario Horticultural Association; Ontario Vegetable Growers' Association; Ontario Crop Improvement Association. The trophy will be awarded annually to the winning team in Inter-Year Debates and a record of the awards will be engraved on a shield each year, to be mounted on the base.

Each year, books will be presented to the four winners. These books will be selected by the Department of English, O.A.C.

Winners, 1950 — Class 1950 (Fourth Year, Ontario Agricultural College).

E. T. Banting, Hazel Cliffe, Saskatchewan.
C. F. Campbell, 2279 Taylor Street, Niagara Falls, Ontario.
J. A. Carman, R.R No. 1, Picton, Ontario.
A. J. Scott, 4 Victoria Street, Guelph, Ontario.

(E) DANFORTH FOUNDATION

Third Year — 1950

William H. Danforth, President of the Ralston Purina Company, offers an annual fellowship of $100, plus transportation allowances which provides for a two weeks' course at the Experiment Station and Plant of the Ralston Purina Company in Missouri and two weeks at the American Youth Foundation Camp at Shelby, Michigan. This Foundation is offered to an outstanding Third Year student.

Summer 1950 — J. W. Biggar, R.R. No. 1, Jarvis, Ontario.

First Year — 1950

A similar fellowship is offered to an outstanding First Year student in the Degree Course, to permit him to attend the American Youth Foundation Camp for two weeks.

Summer 1950 — G. C. Clark, R.R. No. 2, Peterborough, Ontario.

(F) CERTIFICATES

The Inter-University Debating Certificates — 1950

The Department of English at the Ontario Agricultural College presents, each year, a framed certificate to each Inter-University debater in recognition of the work of the O.A.C. and O.V.C. students who participate in the Inter-University debates, carried on under the auspices of the Union Literary Society. Presented only to students in the graduating classes.

Winners, 1950—

E. T. Banting, Hazel Cliffe, Saskatchewan (Fourth Year, O.A.C.)

F. B. Jasperson, Box 329, Kingsville, Ontario (Fourth Year, O.A.C.)

D. Monson, 218 Clemow Avenue, Ottawa, Ontario (Fourth Year, O.A.C.)

D. W. R. Bailey, 962 Island Road, Oak Bay, Victoria, British Columbia (First Year O.V.C.) (Certificate will be presented in his graduating year.)

(G) LECTURESHIPS

Canadian Author Lecture

Not given since 1946.

Class '26 Memorial Lectureship

Not given since March, 1943.

ONTARIO AGRICULTURAL COLLEGE

FINANCIAL STATEMENT

PERIOD—APRIL 1, 1949 TO MARCH 31, 1950

SUMMARY

	Gross Expenditure	Revenue	Net Expenditure
General Offices	$ 738,731.09	$427,002.02	$ 311,729.07
Macdonald Institute	46,189.75	11,625.00	34,564.75
Agricultural Economics Department	32,928.62	———	32,928.62
Agricultural Engineering Department	77,540.35	1,114.05	76,426.30
Animal Husbandry Department	154,419.87	54,695.09	99,724.78
Animal Nutrition Department	45,860.69	384.00	45,476.69
Apiculture Department	29,962.04	7,540.72	22,421.32
Bacteriology Department	75,652.67	1,718.01	73,934.66
Botany Department	55,677.35	———	55,677.35
Chemistry Department	57,909.46	329.20	57,580.26
Dairy Department	63,123.22	31,973.55	31,149.67
English Department	27,360.76	———	27,360.76
Entomology Department	60,098.05	———	60,098.05
Field Husbandry Department	92,627.73	1,841.00	90,786.73
Horticulture Department	99,724.73	1,264.75	98,459.98
Physics Department	24,904.40	———	24,904.40
Physical Education Department	12,069.51	———	12,069.51
Poultry Department	187,491.43	70,811.39	116,680.04
Public Relations Department	64,513.92	———	64,513.92
Soils Department	84,834.66	127.01	84,707.65
Trent Institute	2,499.96	———	2,499.96
TOTALS	$ 2,034,120.26	$610,425.79	$ 1,423,694.47

STATEMENT OF RECEIPTS AND DISBURSEMENTS IN THE TRUST FUNDS, APRIL 1, 1949 TO MARCH 31, 1950

Fund	Bank Bal. Apr. 1/49	Receipts	Disbursements	Bank Bal. Mar. 31/50
Student Loan and Scholarship Funds				
Massey Fund	$ 230.63	$ 2,868.38	$ 1,435.00	$ 1,664.01
Aluminum Laboratories Limited	———	2,021.90	974.13	1,047.77
Borden Co. Ltd.	———	200.00	200.00	———
Bradley, Jean	237.11	68.96	———	306.07
Bray, F. W.	231.72	673.93	———	905.65
Bright, John	1.25	———	———	1.25
Bull, B. H. & Son	266.71	1,000.16	1,242.88	23.99
Can. Feed Manufacturers	26.41	120.28	25.00	121.69
Can. Industries Ltd.	1,009.74	1,020.56	750.00	1,280.30
Canada Packers Ltd.	250.00	1,000.00	1,250.00	———
Cohoe, B. M. Grain Judging	71.72	138.79	136.86	73.65
College Royal Trophy	77.44	4.36	———	81.80
County Grants	———	850.00	850.00	———
Dairy School	164.88	267.87	228.86	203.89
Day, George E.	384.91	6.71	———	391.62
D.V.A. Student Veterans Loan	———	1,650.00	1,610.00	40.00
D.V.A. Student Veterans Repayment a/c	———	553.85	200.00	353.85

Fund	Bank Bal. Apr. 1/49	Receipts	Disburse- ments	Bank Bal. Mar. 31/50
Dominion Rubber Co.,	595.24	1,508.21	2,087.53	15.92
Fuller, Katherine Award	19.91	33.30	35.00	18.21
Graham, Dr. W. R. — Prize	22.46	9.36	9.00	22.82
Harcourt, Dr. Robert — Bursaries	68.15	151.94	150.00	70.09
Macdonald Inst. Alumnae Bursary	20.00	182.26	—	202.26
Midland Scholarship	—	50.00	50.00	—
Millen, F. Eric	5.78	15.00	18.00	2.78
Nutrition Conference School. Can. Feed Manfrs. Ont. Divn.	311.44	4.28	150.00	165.72
Ontario Women's Institute	324.74	578.60	500.00	403.34
Prizes and Scholarship—Dept. of English	.30	—	—	.30
Pullman Co.	122.41	529.97	626.13	26.25
Students Cncl. Assoc. Medal	30.95	6.91	21.00	16.86
Students Cncl. Schol. M. I.	414.73	24.76	379.45	60.04
Webb, Jos.—Prize in Agric. Engineering	29.96	13.01	12.50	30.47
Wilson, Thomas E.	—	225.00	225.00	—
Wilson, J. Lockie Memorial	42.29	11.29	—	53.58
1905 Scholarship	4.03	1,103.56	1,095.00	12.59
1928 Scholarship	—	50.00	50.00	—
1943 Class	90.02	1.43	7.95	83.50
SUB TOTALS	$ 5,054.93	$16,944.63	$14,319.29	$ 7,680.27

STATEMENT OF RECEIPTS AND DISBURSEMENTS IN THE TRUST FUNDS, APRIL 1, 1949 TO MARCH 31, 1950

Research Funds				
American Potash Institute	$ 1,570.33	$ 1,531.69	$ 1,959.66	$ 1,142.36
Animal Nutrition Fund	400.00	285.00	37.72	647.28
Can. Fishing Co. Ltd.	297.48	.56	298.04	—
Can. Inst. of Plumbing and Heating	534.84	1,607.16	1,095.71	1,046.29
Can. School of Baking	25.57	3.46	—	29.03
Car Del Fund	—	72.00	72.00	—
Dale Estate Limited	931.89	5.82	778.67	159.04
Delworth and Campbell	537.54	9.38	—	546.92
Eastern Can. Fertilizer Mnfrs.	2,254.72	28.98	684.48	1,599.22
Frosst, Chas. E. Co. Ltd.	520.01	9.07	—	529.08
Goodyear Tire and Rubber Co.	1,090.02	13.85	685.00	418.87
Int. Minerals and Chemical Corp.	2,570.90	3,195.13	4,667.14	1,098.89
Malting Barley Breeding	2,389.15	3,049.79	2,640.80	2,798.14
North American Cyanamid Herbicide and Defoliant	1,878.27	1,881.27	1,220.20	2,539.34
Nutrition Foundation Inc	93.05	1.62	—	94.67
Ontario Winter Wheat Inst.	818.44	8,013.51	8,767.78	64.17
Ottawa Trust—Vegetables	—	1,054.33	1,054.33	—
Peach Nutrition Investigation A.P.I.	18.83	—	18.83	—
Roses Inc.	—	1,321.53	—	1,321.53
Science Service Co-op Investigation	—	3,026.77	11.09	3,015.68
Soybean Project — Toronto Elevators—Victory Mills	1.47	3,137.55	3,134.07	4.95
Toronto Elevators Ltd.	210.35	1,061.83	600.00	672.18
Trent Inst. Schol. & Loan	515.85	1,080.30	1,049.21	546.94
Wine Producers Association	1,008.37	1,006.70	872.00	1,143.07
SUB TOTALS	$17,667.08	$31,397.30	$29,646.73	$19,417.65

STATEMENT OF RECEIPTS AND DISBURSEMENTS IN THE TRUST FUNDS, APRIL 1, 1949 TO MARCH 31, 1950

Fund	Bank Bal. Apr. 1/49	Receipts	Disburse-ments	Bank Bal. Mar. 31/50
Other Funds				
Christie, Dr. G. I.	$	$ 1,234.33	$ 1,205.00	$ 29.33
Dean, Prof. H. H. Estate	7.06	.13		7.19
D.V.A. Advance a/c		47,801.12	47,801.12	
Faculty Presentations	79.54	.87	30.00	50.41
Foreman Poultry Library	649.72	8.47	278.57	379.62
Infirmary Fund—M.I.	93.59	10.31	46.60	57.30
Lecture Recital Fund	56.31	.98		57.29
Memorial Gate	119.21	9.63		128.84
O.A.C. Students' Book	44.45	.77		45.22
Ont. Dept. Agric.—Special re I.F.A.P. Conference		500.00	500.00	
Short Course Fund	230.16	3.96	7.00	227.12
Stone, Dr. R. E.	176.95	101.94		278.89
Students' Cncl.—M.I. Refrig.	75.13	156.82	231.95	
Students' Cncl.—M.I. Water Softener	25.94	.45		26.39
Students' Recreation	169.48	279.85	172.14	277.19
Union House Building	107.61	107.91		215.52
U. of T. Exam. & Degree Fees	5,160.00	4,180.00	5,220.00	4,120.00
War Emerg. Nutrition Courses	15.16	325.34	10.00	330.50
War Memorial Hall	84.74	263.91	98.00	250.65
Year '42 Re-Establishment	110.95	17.02		127.97
Year '49		1,831.04	1,831.04	
Sundry Account	159.15	2,831.59	2,869.95	120.79
Suspense Account	4.53	43.62	40.18	7.97
SUB TOTALS	$ 7,369.68	$59,710.06	$60,341.55	$ 6,738.19

STATEMENT OF RECEIPTS AND DISBURSEMENTS IN THE TRUST FUNDS, APRIL 1, 1949 TO MARCH 31, 1950

Fund	Bank Bal. Apr. 1/49	Receipts	Disburse-ments	Bank Bal. Mar. 31/50
Student's Society Fees				
Insurance, Accident	$ 19.50	$ 3.00	$ 22.50	$
Athletic Association	121.00	6,227.00	2,524.00	3,824.00
College Royal	18.00	406.50	401.50	23.00
Contingency Fees	11,715.55	6,045.00	7,984.15	9,776.40
O.A.C. Review	8.00	813.00	821.00	
O.A.C. Year Book	1,808.00	2,439.00	1,870.00	2,377.00
Administrative Council	12.30	731.70	602.70	141.30
Christian Association	191.00	569.10	482.20	277.90
Philharmonic and Dramatic	23.80	1,219.50	805.20	438.10
Literary	42.00	1,219.50	1,198.00	63.50
College Newspaper	21.00	813.00	828.00	6.00
Bank Interest		252.26	252.26	
SUB TOTALS	$13,980.15	$ 20,738.56	$ 17,791.51	$16,927.20
GRAND TOTALS	$44,071.84	$128,790.55	$122,099.08	$50,763.31

Eightieth Annual Report

of the

Entomological Society

of Ontario

1949

Published by authority of

HONOURABLE THOMAS L. KENNEDY

Minister of Agriculture

ONTARIO

TORONTO

Printed by the Printer to the King's Most Excellent Majesty

1950

CONTENTS

Entomological Society of Ontario

OFFICERS FOR 1949-50

President: W. N. Keenan, Ottawa, Ontario.

Vice-President: R. E. Balch, Fredericton, N.B.

Secretary-Treasurer, Librarian: Prof. R. H. Ozburn, Guelph, Ontario.

Directors: W. N. Keenan, Ottawa, Ont.; R. Balch, Fredericton, N.B.; Prof. A. W. Baker, Guelph, Ont.; Dr. C. W. Farstad, Lethbridge, Alta.; Prof. A. S. West, Kingston, Ont.; Dr. S. G. Smith, Sault Ste. Marie, Ont.; G. A. Moore, Montreal, Que. *(President Montreal Branch)*; Prof. G. J. Spencer, Vancouver, B.C. *(President B.C. Society)*; C. A. S. Smith, Winnipeg, Man. *(President Man. Society)*.

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Councillors ex officio: Dr. J. Dearness, London, Ont., 1896-98; Dr. E. M. Walker, Toronto, Ont., 1910-12; Prof. L. Caesar, Guelph, Ont., 1917-19; Dr. A. Gibson, Ottawa, Ont., 1919-21, 1937-38; Prof. A. W. Baker, Guelph, Ont., 1927-29; Dr. W. H. Brittain, Macdonald College, Que., 1931-33; W. A. Ross, Ottawa, Ont., 1933-35; Dr. G. Maheux, Quebec, Que., 1938-40; H. G. Crawford, Ottawa, Ont., 1940-42; C. E. Petch, Hemingford, Que., 1942-44; G. A. Moore, Montreal, Que., 1944-45; A. B. Baird, Ottawa, Ont., 1945-47; Dr. G. M. Stirrett, Kingston, Ont., 1947-49.

Editor: Dr. W. R. Thompson, Ottawa, Ontario. *(Canadian Entomologist)*.

Associate Editor: Dr. A. D. Baker, Ottawa, Ontario. *(Annual Report)*.

FINANCIAL STATEMENT

For Year Ending October 31, 1949

Receipts

Carried forward from 1948	$2,836.18
Government Grant	300.00
Bond Interest	48.00
Cuts and Engravings	30.39
Advertising	694.00
Back Numbers	243.72
Reprints	88.12
Bank Interest and Exchange	76.16
Subscriptions	1,127.44
Dues	1,018.07
	$6,462.08

Expenditures

1948 Annual Meeting	$ 76.96
Printing and Mailing Can. Ent.	3,006.85
Printing Back Numbers	630.00
Printing Separates	148.71
Honoraria	200.00
Postage	104.24
Telegraphs	17.97
Stationery and Supplies	46.64
Miscellaneous	122.64
Express	12.50
Bank Exchange	39.31
	$4,410.82
Less Cheques Outstanding	805.00
	$3,605.82
Balance on hand at 31 October, 1949	2,856.26
	$6,462.08

Outstanding Commitments

To printing The Canadian Entomologist to December 31, 1949	1,800.00

R. H. Ozburn,
Secretary-Treasurer.

Audited and found correct 27 October, 1949.

Lawson Caesar
H. W. Goble

REPORT OF COUNCIL, 1949

A meeting of the Council of the Entomological Society of Ontario was held in the MacDonald Room, Fort Garry Hotel, Winnipeg, Man., at 8:20 P.M., November 1st, 1949.

Present: Mr. W. N. Keenan, Vice-President, presided in the absence of Dr. G. M. Stirrett, President; H. G. Crawford; P. C. Brown; W. A. Ross; R. Glendenning; A. W. Baker; J. M. Cameron; B. N. Smallman; J. Marshall; W. R. Thompson; and the Secretary.

Minutes of 1948 Council Meeting were approved as read, following a motion by Messrs. Ross and Glendenning.

Financial Statement was read and elaborated upon by the Secretary, who pointed out that approximately $130.00 was due the Society as a refund on cuts paid by the Society and not yet received from the authors; that $125.00 received for back numbers might have to be refunded if copies of some numbers now out of print could not be secured.

Membership Committee Report: Mr. W. N. Keenan, Chairman of the Membership Committee, reported on the activities of the committee. The Secretary reported:

(1) that during the year there were 18 new members and 18 new student members (that 12 of the student members had since graduated and were now eligible for regular membership);

(2) that during the year owing to the number of members who had discontinued membership owing to increased dues, or other reasons, the total membership showed a gain of 8 members;

(3) that at the present time there were 370 subscribers. This represented a drop of approximately 20 from the previous year. This decrease was largely due to increased subscription rate.

In the discussion on membership the Secretary was instructed to suggest to the incoming Chairman letters and approaches to new members should include specific reference to an improved journal, and should point out that it is a national society in all but name. It was estimated that there could be approximately 500-600 possible members in Canada.

Canadian or National Entomological Society. The discussion on membership involved discussion on the formation of the proposed national society. Although, as pointed out by the Editor, the Entomological Society of Washington was able to stand on its own feet with total membership and subscribers approximating that of the Society, the general feeling of the Council was that it would be a little premature for the Society to attempt to do the same.

Canadian Entomologist. In discussion on The Can. Ent. the proposals by Dr. B. N. Smallman (as below) were discussed at length:

1. The drafting of an editorial policy explicitly stating the types and standard of papers that will be accepted by the journal.

2. The appointment of an editorial board, the members to be drawn from representative fields of Canadian entomological research, to administer the editorial policy, to lay down the procedures for handling manuscripts and proofs, and to act as reviewers and advisers to the Editor.

3. The drafting of instructions to authors to alleviate the work of the Editor and reviewers and to ensure a general uniformity of format.

4. Consideration of publishing the journal on a bimonthly or quarterly basis.

It was finally moved by Messrs. H. G. Crawford and A. W. Baker that "the Editor and Dr. Smallman be a committee to elaborate the present statement of policy to satisfy the apparent needs". Motion carried. The Editor pointed out that at the present time manuscript is scarce and it is necessary to utilize almost any suitable article, and that if any question of an article's suitability arose, said article was referred to referees in the field to which the article belonged.

Place of Meeting, 1950. Messrs. W. A. Ross and H. G. Crawford moved that the annual meetings of the Society in 1950 be held in Guelph. Motion carried. Messrs. R. Glendenning and J. Marshall pointed out that the B. C. Society would celebrate its 50th anniversary in 1951, and tendered a tentative invitation to the Entomological Society of Ontario to hold its annual meeting in B.C. in 1951.

Auditors. The Secretary mentioned that the present auditors, Professors L. Caesar and H. W. Goble, did not wish to continue as auditors. As auditors are appointed by the Directors in accordance with the constitution, the matter was left to the newly elected Directors.

Affiliated and Branch Societies. It was moved by Messrs. A. W. Baker and W. A. Ross that the Council recommend to the general meeting that the affiliation of the Manitoba Entomological Society and the formation of a Maritimes Branch or Maritimes Entomological Society, whichever action was taken by the Maritimes members, be approved, and that the Secretary write a letter on behalf of the Council and Society members that the application was approved.

NOTES ON WRITING SENTENCES

By J. Ansel Anderson
Board of Grain Commissioners for Canada
Winnipeg, Manitoba

Dr. Rudolf Flesch has made a scientific study of factors affecting our understanding of writing. He selected an operational definition for "readability;" then he made a multiple correlation study with a number of independent variables such as sentence length. His results can be summarized in the following advice: use short sentences, short words (i.e., words with few affixes), and many personal references.

Dr. Flesch (2) has written a "best seller" about his research, called "The Art of Plain Talk," that is well worth reading. He gives us a formula for scoring our writing. He also provides a scale by dividing writing into seven classes, from "very easy," which can be understood in the 5th grade, to "very difficult," which can be understood by college graduates. The middle class, "standard," can be understood by high school freshmen; it represents the average difficulty of articles in slick-paper and digest magazines. Most scientific papers rate "very difficult" or worse. As college graduates, we can understand them; but we should read them faster, understand them better, and enjoy them more, if authors followed Dr. Flesch's advice.

At first I thought that the idea of using many personal references was entirely new; but I now classify this under the old advice about preferring the concrete to the abstract. Though current tradition deters us from using personal references in scientific papers, we should use them in our correspondence—particularly when replying to

writers who obviously have a limited knowledge of the language. Do not write, "In reply to your letter of January 12 covering submission of a flour sample for entomological examination, it can now be stated that it shows a severe infestation of *Tribolium confusum*, and it is recommended that the flour be treated by . . ." Write something like this, "Thank you for your letter of January 12. The sample of your flour came today. I gave it to Dr. Smallman who is our expert on insects. He says that the little bugs it contains are often found in flour. They are called 'confused flour beetles.' We think you had better treat your flour by . . ."

In the classical book on English syntax and grammar, "The King's English" by H. W. and F. G. Fowler (3), the sixth sentence reads, "Prefer the short word to the long." The other practical and general rules for choosing words are: prefer the familiar to the far-fetched, the concrete to the abstract, the single word to the circumlocution, and the Saxon word to the Romance. A recent book that can be highly recommended for its excellent treatment of vocabulary is "Plain Words" by Sir Ernest Gowers (4). This was written especially for civil servants and other officials in the United Kingdom who write to and for the public. Demand was so great that the book was reprinted six times in four months.

We have often been advised to write short sentences. I recommend, for instance, a particularly good exposition on this point in "The Loom of Language" by Frederick Bodmer (1, p. 165). According to Dr. Flesch's scale, a mean sentence length of 29 words or more grades "very difficult." The mean for "standard" writing is 17 words. Sentences can readily be kept short in an article such as this; but the task is more difficult in writing scientific papers and requires plenty of hard work. Some advice that may prove helpful is summarized below.

Firstly, use direct statements and active verbs. My 3-year-old looks out of the window and says, "Daddy, dog chase cat." Scientists often write something like this, "It will be observed that, in the case of the cat, it is subject to pursuit by the dog." Secondly, use not more than one subordinate clause, and that generally at the beginning. Thirdly, use defining clauses rather than commenting clauses when possible; use "that" clauses rather than "which" clauses. Fourthly, master the art of punctuation. Learn to use semicolons; these count as periods in scoring sentence length. Do not put groups of related ideas into long dangling sentences; write shorter sentences, and show the grouping of ideas by semicolons. And make only sparing use of constructions that require more than two commas in one sentence.

Clarity is the prime requirement of scientific writing. It is certainly a function of sentence length. But we obtain clarity primarily by a conscientious effort to say what we mean. Let us look at a few examples:

> "The past few years have seen the recognition of cobalt as a deficiency disease." Cobalt is an element, not a disease.
>
> "Readers often find that scientific papers are lacking in the fundamental features of conciseness and clarity." What are the fundamental features of conciseness? I think the writer means the fundamentals of good style. Perhaps he should merely write, "Many scientific papers are neither concise nor clear."
>
> "When first carried out, we too suspected the toxic effects of alcohol." Could be!
>
> "Theoretically, it has been our experience that only under abnormal conditions does this become a reality." With or without context, this sentence has no clear meaning.

Clarity is also a function of conciseness. Now conciseness should be distinguished from mere shortness; a long statement may be concise, and a short statement may be

verbose. Conciseness is obtained largely by avoiding meaningless circumlocutions. Quiller-Couch (5) calls these "jargon;" Gowers (4) calls them "pudder" or "barnacular;" and Flesch (2) calls them "empty words." Since all the experts deal at length with circumlocutions, perhaps we should pay some attention to them. Two lists of common ones are given below. I call the first the "In phrases."

In the case of	With the result that
In the instance of	With reference to
In respect to	With respect to
In regard to	With regard to
In view of	With a view to
In accordance with	From the point of view of
In the nature of	For the reason that
In the matter of	For the purpose of
In the event that	Along the lines of
In connection with	On the basis of

What do we do about them? We keep a list of them handy, and just stop using them —now, and forever. It is as simple as that.

I once tried a scientific attack on the problem of avoiding "pudder." I took a volume of *Cereal Chemistry* and marked each occurrence of "in the case of." There were 47; and there were also 21 examples of that elegant variation, "in the instance of." In about one third of these 68 sentences it was merely necessary to delete the offending phrase. Example: "Moisture did not change in (the case of) material stored in bags." And please note that the writer did not mean that the bags were stored in a coffin or other suitable case. Most of the remaining sentences could be improved by substituting either *with* or *for*. Examples: "No difficulty was experienced in the case of chymotrysin"—*with* chymotrysin; "The initial values were somewhat greater, especially in the case of white flour" — especially *for* white flour.

Another bad habit that leads to excessive wordage can be called "clowning with nouns." The Fowlers tell us that abstract expressions and excessive use of nouns are almost the same thing. Example, "The *emergence* of the adult insects is a frequent occurrence in early May;" amendment, "Adult insects frequently emerge in early May;" thirteen words are thus condensed to seven. But this is amateur stuff; what an expert in pudder can do is astonishing:

> . . . despite the crowded *nature of the* curricula in most undergraduate courses, *it is suggested that consideration be given to the inclusion of* practice in report writing in the junior years, and *that an effort be made to secure* intensive criticism *of such work* by competent English teachers.

The italicized phrases are pudder. If we remove them, we can easily condense by 50 per cent:

> Despite crowded curricula in most under-graduate courses, practice in report writing might well be included in junior years, with intensive criticism by competent teachers.

Of course, entomologists never write like that. Or do they? The following extract contains 97 words in three sentences; the mean sentence length is thus 32 words, which Flesch would class as "very difficult" reading:

> It will be noted that the chemical is not only not exactly identical in structure with natural cinerin I, but also that cinerin I itself is only one of the four constituents or compounds isolated from pyrethrum flowers, which are responsible for the unique advantages associated with pyrethrum. Obviously, therefore, the synthetic compound cannot be correctly spoken or thought of as a synthetic duplication of any of the active principles of pyrethrum. It is not surprising that a study of its entomological behaviour has disclosed marked differences, divergences, and shortcomings, many of which should have been anticipated.

My first attempt to rewrite this piece contained 40 words and four sentences. With a mean sentence length of 10 words, the rewrite would be classed as "easy" reading. But in condensing by about 60 per cent, I may have left out an essential idea. The reader may wish to try his hand at the rewriting.

I need say little about grammar. It presents few problems if you write short sentences. Split an infinitive if you like, but only with a single word. (Personally, I think it a sloppy habit, and rarely permit myself to deliberately split an infinitive.) But beware of dangling modifiers; these are an offence against clarity, a far greater crime in my opinion than an offence with words ending in *ing;* it is as simple as that—almost.

As for rhythm, cadence, euphony, etc., forget them. If the reader wants them, let him read poetry or listen to music. Your business as a scientist is to convey sense (we hope) from your mind to the reader's as clearly as you can. Aside from clarity, you need only conciseness. And if you achieve these two qualities in your writing, that perfection called simplicity may well appear as an unexpected but not unearned bonus.

That is about all I have to say about phrasing. In my opinion, the topic is much less important than the next one in this symposium, namely, organization. No amount of good phrasing will make ill-organized ideas clear. Sound organization is the first and most important step towards clear and concise phrasing.

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THE 1949 GRASSHOPPER CAMPAIGN IN SASKATCHEWAN

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The forecast map for 1949 prepared by the Dominion Entomological Laboratory showed the most serious infestation that the province had experienced since 1940. A heavier than light infestation was forecast in 155 municipalities. A total area of 41 million acres was included in the forecast map with 206 municipalities affected.

Educational Program. An intensive educational program was conducted by the Agricultural Representative Branch with the Dominion Entomological Laboratory and the Field Crops Branch assisting and co-operating in the production of campaign literature and press publicity. Agricultural Representatives held a total of 405 meetings during the period September 1, 1948 to April 30, 1949, on grasshoppers with a total attendance of 22,526.

The Information Division of the Saskatchewan Department of Agriculture prepared a total of 45 emergency grasshopper releases which were distributed to every radio station in the province. Five stations used these releases in their entirety at a regular

time each day. Independent radio stations in the province carried a total of over 2,000 items on grasshopper control. The CBC Farm Broadcast and Ag. Rep. Reporter radio programs and the daily and weekly farm press of the province gave fullest co-operation and excellent publicity on grasshopper control.

Supplies. Briefly, the policy for supplies was as follows:

Ingredients for a sawdust-flour-chlordane bait were provided without cost to municipalities by the Provincial Government. These municipalities mixed and distributed the poisoned bait to farmers without charge. At the same time the Saskatchewan Department of Agriculture purchased ingredients necessary for the formulation of a water miscible concentrate of chlordane commonly termed "chlordane spray" and contracted for the mixing of it. The formulated concentrate carrying 10 pounds of chlordane was sold to farmers at cost, viz. $9.00 per gallon in 5-gallon pails. A chlordane dust containing 10% of technical grade chlordane was sold at 14 cents per pound.

The following table sets out recommended rates of application and costs of poisoned bait and chlordane spray and dust:

	Poisoned Bait	*Chlordane Spray*	*Chlordane Dust*
Amount of mix per acre	4 to 5 gallons	3/5 pint	10 lbs.
Technical chlordane per acre	1/20 lb. (approx.)	¾ lb.	1 lb.
Total cost per acre for material (Includes R.M. mixing of bait)	20 cents (approx.)	70 cents	$1.40

Usage of materials was higher than in any previous campaign in the province. Thirty municipalities used twenty or more carloads of sawdust and eighteen municipalities purchased 500 or more gallons of chlordane. One municipality that had a moderate to severe infestation mixed 42 carloads of sawdust and purchased 1,650 gallons of chlordane spray and altogether used more than 25,000 pounds of chlordane.

The principal materials used during the campaign were approximately as follows:

Carloads of sawdust	1,850
Tons of millfeed	2,500
Gallons of a 10-lb. chlordane concentrate for bait	27,650
Gallons of a 10-lb. chlordane concentrate for spray	36,000
Pounds of a 10% chlordane dust	38,500

Survey of Campaign Results. Since the study of L. C. Paul in 1934 there does not appear to have been a definite attempt towards evaluation of a grasshopper campaign. Where a crop failure would not have been caused by other factors it is always obvious that a successful grasshopper campaign has resulted in a substantial saving of crop. Just how much crop was saved, weak points in the campaign and the extent of participation by farmers is difficult to determine.

In order to collect some first-hand information on the campaign a farm-to-farm survey was undertaken in two municipalities in central Saskatchewan during August and September, 1949. Municipality "A" consisted of 6 townships. Four townships of this municipality were mapped as having a Severe and one and one-half townships as having a Moderate infestation. The infestation in this municipality consisted chiefly of roadside *(Camnula pellucida)* grasshoppers, but the lesser migratory *(Melanoplus mexicanus)* was also present in considerable numbers. Municipality "B" consisted of ten townships of which approximately 3½ townships had been mapped as Very Severe,

one as Moderate and the remainder Severe. In this municipality there was a heavy infestation of the lesser migratory as well as of the roadside species.

In both municipalities early weather conditions were most unfavourable. The previous fall had been extremely dry. Above average temperatures were general during late August and early May followed by almost three weeks of dry cool weather and high winds. Soil drifting was common throughout the area, precipitation during April and May was practically nil and a severe frost was experienced on the 23-24 of May. Hatching of grasshoppers became general between the 6-8 of May at a time when crops varied from just emerging to about two or three inches in height. Due to the extremely dry conditions, there was no growth of grass on roadsides at this time. Municipality "A" received good rainfall during June and an estimated average yield of 11 bushels of wheat were harvested. Municipality "B" on the other hand continued to experience severe drought and the final average yield for that municipality was estimated as less than 3 bushels of wheat per acre.

Results of Survey in Municipality "A." All farms in municipality "A" were visited and 245 reports representing all but a very few farmers who could not be contacted were completed. In this municipality two farmers did nothing to control grasshoppers. Poisoned bait was the principal means of applying toxicant with 241 farmers using an average of 2¾ tons of bait. Eighty farmers used chlordane as a spray in addition to bait and applied an average of 5½ gallons in amounts varying from one half to forty-five gallons. Two farmers used chlordane spray only. Twenty-six of those using poisoned bait spread it by hand and 215 used bait spreaders.

Two hundred farmers did use trap strips in their 1949 summerfallow operations. In many cases the trap strips were not effective because the traps were put in too late in the season. When the first summerfallow operation was completed before mid-June and the trap strips were poisoned or sprayed, adjacent crops were not too seriously affected by adult grasshoppers. Adult infestation as determined by sweeping at the time of the survey showed thirty farms with a field infestation of 2½ or more grasshoppers per square yard. There was no campaign on two of these farms, sixteen did not use trap strips, eleven had trap strips that could be rated as poor to fair and only one used trap strips as recommended.

The following table compares estimated damage on summerfallow and stubble crops:

	Summerfallow	*Stubble*
Acreage sown	52,874	8,141
Estimated average loss	46%	4%
Variation in loss	0-50%	15%-100%

Where stubble crop was saved it was done only by baiting or spraying the whole area several times. Heaviest losses on summerfallow, caused by the invasion of grasshoppers from field margins and roadsides, etc., usually occurred when a farmer delayed the beginning of his campaign. Where a considerable acreage of stubble had been sown, damage on the summerfallow crop was usually heavier, probably reflecting the amount of time required for protection of the stubble crop and less time available for protecting the summerfallow crop. The following comparison between two divisions of the municipality illustrates these points:

Infestation forecast	Acres seeded Fallow	Stubble	Estimated per cent loss Fallow	Stubble	No. Farmers started campaign Before May 15	May15-25	After May 25
Severe	8,431	1,031	2	35	26	11	1
Severe to Moderate ..	7,545	2,218	10	73	16	22	5

In this municipality it was evident that if there had been no grasshopper campaign there would have been no crop harvested. The average yield harvested was just over 11 bushels per seeded acre with an estimated total value in excess of one million dollars. Costs to the Provincial Government for supplies and freight and to the municipality for operating the mixing station, etc., totalled $21,289.00 Costs to farmers as reported by them in the survey, including costs of purchasing chlordane and for application of bait and spray amounted to a total of $17,285.00. The average cost per seeded acre was 63 cents. Assuming that there would have been no crop without the campaign it may be stated that for a total expenditure of less than $39,000.00 more than $1,000,000.00 of crop was saved, representing a return of $26.00 per dollar spent in the campaign.

Results of Survey in Municipality "B." Weather conditions in Municipality "B" were more severe than in Municipality "A" and the final average yield for municipality "B" was less than three bushels per acre. Unfortunately, time only permitted a partial survey of this municipality. Eighty-two farms were visited, 19 in a block in the North West corner of the municipality and sixty-three in the central portion of the municipality towards the South East.

Four of the eigthy-two farms visited did nothing to control grasshoppers. Forty-five farmers used poisoned bait only and thirty-three used both bait and spray. The seventy-eight farmers using bait applied an average of 1¾ tons and the thirty-three farmers using spray applied an average of seven gallons.

Sixty-five farmers did attempt to use trap strips but of these twenty-eight did not put in the traps until July at which time they were of no value. All but five farmers used spreading machines for applying bait.

Of the 31,106 acres included in the survey 6,396 were seeded on stubble by sixty of the eighty-two farmers visited. The average loss caused by grasshoppers on stubble crops was estimated as 62.7% compared to an average estimated loss of 13.5% on summerfallow crop. The majority of the farmers visited agreed that it had been a mistake to seed stubble and that the time spent in trying to save it was largely wasted.

The campaign in this municipality suffered seriously from severe soil drifting and frost, together with the prolonged drought with the result that many farmers felt there would be no crop whether they controlled the grasshoppers or not. It should be noted, however, that several farmers who waged very good campaigns had yields of 8-10 bushels per acre compared to neighbours whose yields were one bushel and less. The difference was apparently due to grasshopper damage as a result of a poor campaign.

Savings as a result of the campaign in this municipality were also computed on the assumption that no crop would have been harvested if there had been no grasshopper campaign. The costs of the campaign amounted to $5,167.00 for bait materials and mixing. The cost to farmers for the purchase of chlordane spray and application of materials was estimated by them as $4,311.00. The average cost of the campaign per seeded acre was 31 cents. 91,427 bushels were harvested with an estimated value of $137,000. The return per dollar expended on the campaign was $14.00.

Discussion. As poisoned bait was used almost exclusively in the early stages of the campaign and as where chlordane spray was used it was applied later in the season, often on stubble crop there was little opportunity for farmers to compare the relative merits of the two methods of applying grasshopper toxicant. The majority of farmers were well satisfied with the kills obtained from poisoned bait and approximately half of them stated they would use only poisoned bait in the future. Opinions were obtained from 64 farmers who used both bait and spray. Of these, 39 stated that bait and spray were about equally effective, that both had a place in a campaign and that they would continue to use both. Twenty-three stated that spray gave better results than bait, one that bait was better than spray and one stated that neither was effective.

The campaign was an unusually difficult one. There were numerous very heavy deposits of eggs on roadsides. Hatching occurred early in relation to crop development and was general about the 10th of May and continued until well into June. As a result many farmers had to bait the same areas as many as 10 or 12 times during the season. Five or six applications appeared to be about the average required for good control. No good comparisons on this point were possible between bait and spray. Several farmers stated that they sprayed the same areas as many as four times and in many cases two or three applications of spray were made on the same area.

More than twenty municipalities had a similar infestation and campaign and took off about the same average crop as Municipality "A" referred to above. In approximately fifty municipalities, there was practically no crop harvested due to drought. In the remaining eighty-odd municipalities, savings could be estimated as between 100,000 and three-quarters of a million dollars each. Altogether it seems that $50,000,000.00 would be a conservative estimate of the amount of crop saved by farmers in Saskatchewan by their grasshopper campaign.

Acknowledgement. This article would not be complete without making grateful acknowledgement to Dr. A. P. Arnason, Agricultural Scientist-in-charge and to H. W. Moore, Agricultural Scientist of the Dominion Entomological Laboratory of the Science Service of the Dominion Department of Agriculture and members of their staff who spared no effort to make the campaign a success and rendered every possible assistance to Agricultural Representatives and the Field Crops Branch.

A STUDY OF SOME OF THE EFFECTS OF CERTAIN FOOD PLANTS ON THE GRASSHOPPER, *MELANOPLUS MEXICANUS MEXICANUS* (SAUSS.) (ORTHOPTERA: ACRIDIDAE)[1]

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Various workers have observed that when grasshoppers have a choice of several different varieties of a cereal crop, as for instance in experimental plots, they feed preferentially on some varieties and avoid or feed less on others. Various factors may give rise to this behaviour; it may be due to physical factors that affect ease

[1]Contribution No. 2695, Division of Entomology. Science Service, Dept. of Agriculture, Ottawa, Canada

of ingestion or palatability of the plants, or it may be something in the chemical constitution of the plant that brings about what might be called, for lack of a better term, an instinctive selection of certain varieties.

If grasshoppers are capable of selecting for food those plants favourable for normal development, an explanation of this behaviour may be found by specific feeding experiments. Accordingly, over a three-year period, an experiment was conducted wherein a species of grasshopper, *Melanoplus mexicanus mexicanus* (Sauss.), was given only a single species or variety of plant to feed on during all of the active part of the life-cycle. Plants commonly available to grasshoppers were used as food, including wheat, barley, sweet clover, alfalfa, Russian thistle, and dandelion. These foods showed significant differences in their effects. In each succeeding year of the experiment the grasshoppers were fed the same food as their parents. Various criteria were used to measure the effects of the food on the insects: principally percentage survival, duration of developmental period, and rate of oviposition.

Survival ranged from 70 per cent on dandelion and wheat to less than 10 per cent on alfalfa. By the end of the third year the line on alfalfa terminated, for only one individual, a female, completed the adult moult and she laid no eggs.

The number of eggs laid per female, though not so consistent a measure as percentage survival, showed a definite range from a maximum on dandelion, Renown wheat, and Plush barley to a minimum on sweet clover, Russian thistle, and alfalfa. With very few exceptions, the number of eggs laid showed a distinct downward trend throughout the three years, even on apparently favourable plants.

The number of days required by the insects to reach maturity varied but slightly with the different foods. Only those fed on alfalfa took a significantly longer time to become adult.

From the evidence of all the criteria used, it appears that dandelion and wheat are very favourable for *M. m. mexicanus*, whereas sweet clover and particularly alfalfa are definitely unfavourable.

In another experiment 21 varieties of barley were tested. Survival of *M. m. mexicanus* ranged from 60 per cent to less than 5 per cent. The number of eggs laid per female also varied considerably with the variety. Generally those hoppers that had a high survival rate as a result of feeding on certain varieties had a correspondingly high rate of oviposition.

These results, of course, reveal nothing directly of what factors in the plant bring about these differences in response. In an attempt to confine the problem to fewer factors, an experiment was designed in which wheat was grown in nutrient solutions that differed in amount of available nitrogen. Such wheat, after reaching a height of about five inches, was used to feed *M. m. mexicanus* throughout its active life-cycle. The total nitrogen content of the wheat on a dry-weight basis, averaged 6.16 per cent in that series supplied with the greatest amount of nitrogen and 3.33 per cent in that supplied with the smallest amount. Within this range, survival and development of the insects varied considerably. Fifty per cent survived and matured on the wheat with the highest nitrogen content, and 30 per cent on a median treatment, whereas on the lowest only 7 per cent survived and none of these became adult during the course of the experiment (66 days). Development was more rapid on the wheat having high nitrogen content, and the rate of oviposition was also considerably greater. It seems then that the degree of favourability of wheat as a food for *M. m. mexicanus* is correlated with a high nitrogen content.

Acknowledgments. This work, initiated by R. H. Handford, now Officer-in-Charge, Dominion Entomological Laboratory, Kamloops, British Columbia, was carried out

at the Dominion Entomological Laboratory, Brandon, Manitoba. To Dr. Handford the author is very grateful for his continued advice. Thanks are also due to W. Chefurka, now of the Field Crop Insect Laboratory, Lethbridge, Alberta, who was associated with the earlier work, and Miss F. E. Northcott, of the Lethbridge laboratory, who took care of the rearing of the grasshoppers and helped immeasurably in the analysis of the data.

ALDRIN, CHLORDANE, DIELDRIN AND TOXAPHENE COMPARED FOR THE CONTROL OF GRASSHOPPERS IN MANITOBA IN 1949

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Introduction. Two series of field experiments were made in Manitoba by the Department of Entomology in 1949 to determine the relative effectiveness of four different insecticides for the control of grasshoppers. One series of field experiments was undertaken near Elm Creek in a short grassed pasture field of mixed Kentucky blue grass and couch grass on rather light sandy soil. The second series was carried out in another grass pasture on heavier soil along the Red River near Morris. In both instances the grasshopper population consisted almost entirely of the clear-winged grasshopper *Camnula pellucida* (Scudd.).

Method. Each of the four insecticides, in an emulsifiable form, was used at two concentrations, one at twice the strength of the other, as shown in Table I and Table II. A Buffalo Turbine was used to apply the spray to the grass in each field and this when moved by a tractor at the rate of approximately seven miles per hour, delivered approximately five gallons of spray per acre. At Elm Creek the eight sprays were applied on June 9 from about 10:30 a.m. to 12:30 p.m. on a bright day with a temperature of 86°F. at 1:00 p.m. At Morris the spray was applied near the middle of the afternoon of June 20 to grass which had become dry after rain in the morning. The operators of the spraying outfit used about two and one-half gallons of each spray on each outgoing trip on each measured plot and then turned the machine around and sprayed the other half of the mixture on the adjoining area on the journey back to the starting point. The Buffalo Turbine threw the spray with great force over a space of twelve or fifteen yards or more so that the area covered was about twenty-five or thirty yards wide and involved an area of approximately one acre. An unsprayed strip of about the same width was left between successive plots.

In both series, the effects of the different insecticides was checked in approximately forty-eight hours. A screen of wire mosquito netting one foot square with turned down edges was used to assist in making counts of grasshoppers in the various sprayed plots. This screen was tossed at random on the plot where the count was to be made. Counts were made of dead, dying and live grasshoppers for each throw of the screen. On each of the eight plots at both Elm Creek and Morris, ten such counts were made, making eighty counts for each of the two locations. In Table I and Table II the calculations show for each plot the percentage of dead grasshoppers, of dying grasshoppers and the percentage of total grasshoppers killed. The last column of each table shows the total number of grasshoppers involved on ten square feet of field surface for each spray mixture.

TABLE I
Elm Creek Grasshopper Control Trials 1949

Chemical used[1]	*Amount technical chemical used*	*% dead grasshoppers*	*% dying grasshoppers*	*Total % killed*	*Amount technical chemical used*	*% dead grasshoppers*	*% dying grasshoppers*	*Total % killed*	*Total number of grasshoppers involved*
Aldrin[2]	4 oz.	93	6	99	2 oz.	92	7	99	619
Chlordane	16 oz.	97	1.5	98.5	8 oz.	93.5	3.5	97	350
Dieldrin[3]	4 oz.	99	.5	99.5	2 oz.	100	0	100	698
Toxaphene	24 oz.	98	2	100	12 oz.	98	1	99	484
							Total grasshoppers		2,151

TABLE II
Morris Grasshopper Control Trials 1949

Chemical used[1]	*Amount technical chemical used*	*% dead grasshoppers*	*% dying grasshoppers*	*Total % killed*	*Amount technical chemical used*	*% dead grasshoppers*	*% dying grasshoppers*	*Total % killed*	*Total number of grasshoppers involved*
Aldrin[2]	4 oz.	60	27	87	2 oz.	50	7	57	29
Chlordane	16 oz.	70	11	81	8 oz.	40	6	46	62
Dieldrin[3]	4 oz.	91	9	100	2 oz.	79	7	86	36
Toxaphene	24 oz.	76	14	90	12 oz.	52	7	59	83
							Total grasshoppers		210

[1]In each of the sixteen trials indicated in Table I and Table II the stated amount of technical chemical used was in an emulsifiable form and was mixed with five gallons of water.

[2]Aldrin was formerly compound 118.

[3]Dieldrin was formerly compound 497.

Summary and Conclusions.

1. Much the better kill was obtained in the Elm Creek experiment where the infestation was approximately ten times as great as that at Morris and when the weather was more favourable.

2. At Elm Creek, aldrin, chlordane, dieldrin and toxaphene all gave at their respective lower concentrations very satisfactory control. At Morris, dieldrin gave the best control.

3. The Buffalo Turbine applied the sprays quickly and effectively and is especially useful along the edges of fields, roadsides, pasture land, etc.

4. Both aldrin and dieldrin are very free flowing. Each container should have a lip for wasteless pouring.

5. Neither aldrin nor dieldrin seemed to mix as readily with water as chlordane and toxaphene. A better emulsifier is indicated.

Acknowledgements. The writer is indebted to Julius Hyman and Co. for the aldrin, chlordane and dieldrin, and to Hercules Powder Co. for the toxaphene used in these trials. He is also indebted to officials, especially to Mr. H. E. Wood, of the Manitoba Department of Agriculture, who made arrangements for the use of the Buffalo Turbine and who applied the insecticides as directed. Financial assistance is also gratefully acknowledged from the Manitoba Department of Agriculture in connection with certain expenses which were incurred.

THE FIRST RECORDS OF EUROPEAN CORN BORER IN WESTERN CANADA*

By C. A. S. Smith
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The possible invasion of the corn growing areas in the prairie provinces has been a matter of considerable concern to the corn producers here for some years, and its steady progress in a north-westward direction in the United States has been closely watched. It was appreciated that it was probably only a matter of time before this insect would establish a foothold in Manitoba and probably continue across the prairies.

The increase in acreage devoted to corn growing in Manitoba in recent years has been steady, and in 1948 the increase in the acreage of sweet corn was almost spectacular, jumping from about 2,500 acres in 1947 to 4,500 acres in 1948; approximately the same acreage was planted in sweet corn this year. It is anticipated that there will be an increase in the sweet corn acreage next year.

For several years the Division of Plant Protection has carried out European corn borer scouting in Manitoba, but not until this year has it been officially reported as being present. This year, after it had been officially recorded from the Morden area, it was reported that it had been seen in the southern part of the province last year, but to my knowledge this was not officially established.

The first infestation of European corn borer was found on August 4th on the experimental plots of the Dominion Experimental Station at Morden. The following

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week, infested fields of sweet corn were also found in the vicinity of Hochsfeld, about 8 miles south of Winkler and within 4 or 5 miles of the U. S. border.

Corn earworm was very prevalent in the corn fields this year, and many reports of corn borer infestation were received in the office, some of which no doubt were erroneous because of the confusion arising between these two insects. About 50% of the corn ears were infested with both corn earworm and corn borer, but the borer damage to the ear was really very slight, heavy damage occurring in the stalks.

A considerable acreage of sweet corn east of the Red River, running from Ladywood area through Winnipeg, Niverville and Steinbach districts, is grown under contract to canning plants, and reports were received that these areas were much more severely infested by both pests than the Morden-Winkler area which is closer to the U. S. border and thought to be more exposed.

Another interesting point is that the concentration in the corn seed test plots at the Dominion Experimental Station at Morden was very much greater than found outside in the Morden-Winkler area. This might suggest that a small number of European corn borer larvae may have overwintered in the immediate vicinity of the Experimental Station. Large quantities of dried corn on the cob are stored in cribs within a few hundred yards of the Dominion Experimental Station and it is known that last winter was an extremely favourable one for the survival of this insect. Precipitation was heavier than usual and temperatures were fairly constant.

It is also evident that the bulk of the infestation discovered this year was due to a migration from Minnesota or North Dakota, or both. On July 5-7 adult moths were observed in large numbers in corn fields east of the Red River in Manitoba. During this period a steady 18 m.p.h. south wind prevailed. A week later the wind increased to 22 m.p.h. and by July 25 with continuous south winds blowing from 27 to 30 m.p.h. provided ideal conditions for helping these insects along to the corn fields of Manitoba. It was reported that during July of this year a severe flare-up of the corn borer had occurred in Minnesota and that a migration into Manitoba immediately north was to be expected.

When first officially observed, the larvae found in the corn stalks were in advanced stages of development and in many cases had pupated. Specimens collected and reared in the office emerged as adults after a comparatively short period (5 or 6 days) which suggested to us that the borers present in Manitoba were of the two-generation strain and that a second generation could be expected to develop to the hibernating stage this year. That this was the case has been established in that corn ears infested with larvae have been brought into the office as late as October 11th.

In September, Mr. P. C. Brown, of the Plant Inspection Office, Estevan, Saskatchewan, reported that as a result of scouting operations from his office, corn borer infestations were found in the south-east corner of the province of Saskatchewan. All of these infestations were found in sweet corn plots and none in fodder corn fields, no infestations having been found west of Estevan and north of Highway 18.

There is no evidence yet that European core borer will overwinter here, though it is very probable. The year 1950 should provide some indication.

EUROPEAN CORN BORER OCCURRENCES IN NORTH DAKOTA

By J. A. MUNRO[1] and WAYNE J. COLBERG[2]

The first record of European corn borer occurrence in North Dakota was from near the eastern border, at Hillsboro (Traill County), on August 12, 1946. For that year and the two years following, the pest spread slowly and caused no loss of economic importance. By the summer of 1948 a few specimens were collected at Jamestown, which was an advance of about 100 miles westward, but there was no further advance to the north. Up to this time the one-generation strain predominated. During 1949, however, the two-brooded or two-generation strain came into prominence.

In 1949 the borer spread more than 100 miles further west and north than previously recorded in the state. A recent survey conducted jointly by the North Dakota Agricultural Experiment Station and Extension Service shows the borer to be now established in all of the eastern counties, and extending westward fully two-thirds of the way across the state.

The rapidity and extent of this spread in 1949 was apparently due to the dominance of the two-brooded strain and the prevailing southerly winds of the past season which aided the moths in their dispersal.

The damage caused in 1949 was due largely to the second brood. This was confirmed by observations conducted on plantings of sweet corn at several widely distributed points in North Dakota during mid-summer when the first brood was maturing, and again in the same localities in the fall when the second brood was in the larval stage. At Bismarck. Fargo and Northwood examination showed the maturing larvae and pupae to be present in about two per cent of the stalks in mid-summer. A fall check-up of the same plots showed an average of 88 per cent of the stalks infested. The increase represented the second generation which had developed since mid-summer.

Lighter infestations, however, usually prevailed in field corn. Most reports of corn borer activity were received in late summer as further evidence that borers were not sufficiently abundant until then to attract much attention.

Field observations conducted during the fall of 1949 indicated a wide variation in the condition of the hibernating larvae. In the northern counties fully eighty per cent of the borers appeared to be too immature to survive the winter, but in the southern counties most of the larvae had advanced to a satisfactory stage of development for wintering. Most of the larvae were found in the lower one-third of the stalks.

To determine to what extent that parasitism might possibly be present, collections of 50 larvae were made from each of the following places in North Dakota: Binford, Bismarck, Ellendale, Fargo, Hamilton, Mapleton, Michigan, Minot, Northwood and Valley City. The collections were forwarded to the European Corn Borer Laboratory, U. S. Bureau of Entomology & Plant Quarantine, Moorestown, New Jersey, for observation.

The losses caused by European corn borer are due largely to the reduction in yield from the feeding and boring of the larvae into the plants, the weakened stalks breaking over in the wind, and the ears falling to the ground as a result of borer tunneling. During the fall of 1949, at harvest-time, an examination of fallen ears in borer infested fields in the Red River Valley showed 90 per cent of those which had broken away from the stalks to have had their shanks weakened by borer damage.

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Borer damage to the ears exposes the developing kernels to the organisms which cause mold and rots. The presence of the larvae in sweet corn detracts from its market value and table use.

Corn Borer Loss in North Dakota. A conservative estimate, based on evidence that one borer per stalk causes a 3 per cent reduction in yield, indicates that European corn borer caused a loss of 325,560 bushels of corn in North Dakota in 1949. Computed on the basis of the October 15 price of 96c per bushel this represents a monetary loss of $312,345.60.

A survey based on the examination of four to 12 fields at fairly well distributed points in each of the counties shows the borer population to have averaged 65 larvae per 100 stalks in the eastern or Red River Valley counties, as contrasted with only five borers per 100 stalks in the counties marking its westward spread in North Dakota.

The prevalence of European corn borer in North Dakota, while objectionable, is not believed to be a serious threat to corn production provided adequate steps are taken in meeting the situation.

Once the borer becomes established in a corn-growing area it is unlikely that any type of applied control will be anything more than a partial check on the pest. Of the various measures, clean ploughing in fall or early spring to bury the stalks which harbour the larvae, to prevent their escape as moths, is considered more effective when done on a widespread basis, making silage of the corn and not allowing stalks to remain exposed around farmyards are also of importance in checking the pest.

Stalks shredding and chopping machines are occasionally used to kill the larvae and to aid in clean ploughing. A check-up on results obtained on a field near Mapleton where one of these machines was used during the fall of 1949 showed about 85 per cent of the overwintering borers to have been destroyed. It was evident that the main advantage of this pulverizing or crushing action was to insure clean ploughing and prevent the stalks from being harrowed to the surface in spring tillage operations.

In the north central and eastern states where the borer problem has been more severe and of longer standing, insecticides have been used to advantage in combating the pest. Both D.D.T. and Ryania dust have been used for the purpose.

Various state and federal experiment stations are endeavouring with a fair degree of success to develop varieties of corn which stand up fairly well and produce satisfactory yields in the midst of heavy infestations. There are, however, no varieties known to be immune to the borer.

Acknowledgements. Appreciation is expressed to the County Extension Agents who reported on their field observations for their respective counties; to Mr. Royce B. Knapp for collections of corn borer larvae from Binford and Minot; to Mr. Amos Mallow for the collection of larvae from Ellendale, and to members of the Experiment Station staff who reported on their findings.

BREEDING FOR THE PRODUCTION OF SAWFLY RESISTANT SPRING WHEATS[1]

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Breeding for sawfly resistance in spring wheat has been an active project of the Cereal Division, Experimental Farms Service for the past twelve years. This project has been conducted as a co-operative effort with the entomologists and pathologists of Science Service and the chemists of the Board of Grain Commissioners. During that time the new variety Rescue was produced and released for commercial production. This variety possesses a high degree of sawfly resistance but is not entirely satisfactory from a quality standpoint. It was recognized, as early as 1942, that this variety was likely to have certain defects and a new breeding programme designed to make the necessary corrections was initiated. This breeding programme will be described, together with the difficulties that have been encountered and the plans that have been made to meet them.

In designing the programme three major points were given consideration. The first was that it should require a minimum of skilled and experienced help; secondly that the populations contain adequate numbers to insure the recovery of the desired types; and thirdly that the programme be completed in the shortest possible time.

With the above ideas in mind a programme based on the bulk plot technique, with periodic mass selection was developed. An example of the procedure is shown in Table I.

TABLE I

A bulk plot method of breeding combined with mass selection.

Year of programme	*Time of year*	*Procedure*
1st	Summer	Make the cross
	Winter	Grow F_1
2nd	Summer	Grow F_2 Mass select resistant plants
	Winter	Grow F_3
3rd	Summer	Grow F_4 Select resistant plants individually
	Winter	Grow F_5 Lines. Bulk those homozygous
4th	Summer	Grow bulked lines at 4 Stations. Discard sawfly-susceptible lines. Make preliminary quality tests on the remainder.
5th	Summer	Preliminary yield and quality tests.

From the first the programme has given poor results. No difficulty was experienced in getting large numbers of apparently resistant F_4 plants but when these were grown under sawfly infestation as F_6 lines the great majority failed to show the resistance of the resistant parent. As older populations failed to produce adequate numbers of resistant plants the size of the F_2 and the number of F_4 plants selected was increased until recently some 4,000 F_6 lines from one cross were grown. It was necessary to discard about 3,000 because they were not equal to the resistant parent in sawfly reaction; despite their having been selected in the F_2 and F_4, and resistance is a recessive character. Something like 10% of the discarded lines could be classified as susceptible or moderately susceptible while the balance were moderately resistant.

[1]Contribution No. 151 from the Cereal Division, Experimental Farms Service, Dominion Department of Agriculture, Ottawa, Canada.
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In this test Rescue was cut on the average about 7% and the great majority of the hybrid lines were cut from 10% to 20%. It is obvious that while the programme was reasonably efficient in eliminating susceptible material it was inefficient in eliminating moderately resistant material.

The reason for the inefficient elimination of moderately resistant plants would appear to be due to the cumulative effect of genes for sawfly resistance, and the effect of environment which makes it difficult to evaluate the reaction of individual plants.

The data obtained do not provide exact information on the genetics of sawfly resistance but there is evidence that at least four genes are involved. There are at least three genes for stem solidness which is a prerequisite of sawfly resistance. There is at least one additional gene because differences in reaction can be demonstrated between equally solid and equally hollow varieties. It is known that the genes for stem solidness are cumulative in nature. It would be expected that there would be a wide range in the reaction of hybrids from segregating populations. Relatively few hybrids would be as resistant or as susceptible as the parental varieties and the great majority would have an intermediate reaction.

With regard to the effect of environment it has been shown that there is a significant station and season effect on varietal reaction. This is not hard to visualize if we consider resistance to be an interaction between host and parasite. Both living organisms are constantly under the stress of environmental conditions. When all conditions favour the host and are unfavourable to the parasite a high level of resistance is reached. Under these conditions, or conditions approximating these, perhaps only one of the probable four genes for resistance is necessary to protect the plant from injury and the plant is classified as resistant only to prove susceptible in later tests. One can judge the general level of resistance in a given test by the reaction of the parental varieties and so determine roughly the level of efficiency that is likely to be obtained by selection under those particular conditions. From experience it seems that only rarely is the general level of resistance so high that susceptible or moderately susceptible plants escape detection. Conversely it is only rarely that conditions are such that moderately resistant plants can be identified and eliminated. It would be expected on genetical grounds to find relatively large numbers of moderately resistant plants and very few resistant ones. Since resistant and moderately resistant plants cannot ordinarily be separated with accuracy, it is to be expected that the population would contain a preponderance of the moderately resistant types. This is what has happened in the present programme.

In view of the results obtained, the possibilities of the progeny row method of breeding is now being investigated. A very large F_2 will be grown with special care to produce the maximum sawfly damage. Apparently resistant plants will be selected. Because it is now known that we cannot distinguish between resistant and moderately resistant, plant selections will have to be taken in large numbers. The progeny of each selected plant will be grown in an F_3 line. Selection in the F_3 lines will be made from those that appear to carry the maximum number of genes for sawfly resistance. It is hoped that most of the moderately resistant material can be eliminated in the F_3. Those that escape will almost certainly be detected when the F_4 families are grown. Thus, by the time the lines are bulked in the F_4 practically all of them should be sawfly resistant.

The proposed change in the breeding programme will lengthen the time required for carrying it out and will involve more work in the early generations. It is expected however, that work in later generations will be reduced, that the possibilities of a cross can be assessed sooner, and that the maximum number of resistant plants can be isolated.

The work described above illustrates a number of points that while not new are worth reiterating. Breeding for insect resistance is fundamentally the same as breeding for any other character. The degree of efficiency that can be obtained in the breeding programme depends upon the amount of information and the techniques available to the breeder. The first thing the breeder must know is how to differentiate between resistant and susceptible material, the margin of error involved, and the factors likely to affect the tests. When this has been established the genetics of resistance can be studied, physiologic races identified, and all other necessary information collected. The more information available the more efficiently can the breeding programme be carried out.

One other thought on the topic of this symposium should be recorded. The production of crop plants resistant to insect pests is not a prerogative of plant breeders alone or of entomologists alone. These people should work together. But, we still find, even within the ranks of the workers, those who want to draw lines and erect fences. It is not practical to do so. In the field of insect resistance workers are needed with a sound knowledge of both the insect and the plant. For convenience one may work predominantly on the insect and the other on the plant but each should know the details of the other's work and be prepared, and capable, to undertake work on that important borderline, the impact of the one organism on the other.

ANEUPLOIDS IN GENETICS AND BREEDING OF WHEAT[1]

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Aneuploids, individuals whose somatic chromosome number is not an exact multiple of the basic haploid number, can be useful in genetic analysis and, theoretically at least, in breeding. It is fortunate that polyploid organisms, such as the hexaploid, common bread wheat, whose genetic complexity makes them least amenable to orthodox methods of analysis and breeding, are the very ones to which these newer methods may be applied. They can tolerate deficiencies and duplications that would be lethal to organisms with smaller reserves of essential genic material.

Types of aneuploids used by Sears (1, 2, 3) in genetic analysis of wheat are shown in Table I.

TABLE I

Aneuploids in Hexaploid Wheat

Type of aneuploidy		*Chromosome configuration at meiotic metaphase* I
Deficient	nullisomic	20″
	monosomic	20″ & 1′
(Normal)	disomic	21″
Duplicated	trisomic	20″ & 1‴
	tetrasomic	20″ & 1⁗

[1]Contribution No. 2694, Division of Entomology, Science Service, Department of Agriculture, Ottawa,

Normal plants of common wheat have 21 pairs of somatic chromosomes, that is, they are disomic for every chromosome. On the other hand, nullisomics are deficient in both members of a single pair of chromosomes. Monosomics are deficient in only one member of a pair. Trisomics have one chromosome in triplicate, whereas tetrosomics have one set of four homologous chromosomes. Thus, the genes on a chromosome involved in a complete series will be present in doses varying from zero to four. It is obvious that in a species whose normal haploid complement is 21 it is theroretically possible to have 21 different sets of aneuploids. Monosomics have been obtained for all 21 pairs of chromosomes in common bread wheat.

It is necessary to know which chromosome bears a given gene before aneuploids can be used to build desired characters into a variety. Three methods of locating the chromosome in which a given gene exists are:

(a) F_2 analysis;

(b) production of deficient aneuploid lines;

(c) systematic substitution of each of the 21 chromosomes in one variety for the homologous chromosome of a variety with a contrasting character.

F_2 analysis is carried out as follows. Each of the 21 deficient aneuploid lines, usually monosomic, is used as the female parent in a cross with the variety to be tested as the male parent. Monosomic hexaploid wheat plants form female gametes in the proportion of one normal to three deficient instead of the 1:1 ratio expected, regardless of the chromosome involved (1). This is attributed to the loss of the unpaired monosome during reduction division. Both kinds of female gametes are capable of functioning. Hence, three-quarters of the F_1 zygotes will be monosomic, obtaining their monosomes from the male parent. In most cases the monosomic F_1 plants must be determined by means of microscopic observation of the pollen mother cells. The monosomic individuals of the F_1 are permitted to self in order to produce the F_2 generation. Table II indicates the expected constitution of the F_2 population in hybrids in which the transmission of deficient male gametes is about 4 per cent; this percentage varies with different chromosomes (1).

Table II

Constitutions of F from a Monosomic F_1 Hybrid

♂ gametes / ♀ gametes	21 chromosomes 0.96	20 chromosomes 0.04
21 chromosomes 0.25	21″ 0.24	20″ & 1′ 0.01
20 chromosomes 0.75	20″ & 1′ 0.72	20″ 0.03

Normal 24%
Monomic 73%
Nullisomic 3%

Whether the inheritance of a character is complex or simple the presence of a gene affecting that character will be indicated by an upset in the normal F_2 ratio in those families derived from aneuploids for the chromosomes concerned. If the character under study is brought about by a single gene difference between the parents, and if the gene in the variety being tested brings about its effect only when present in two doses, only the disomics will show the character. They will constitute approximately one-quarter of the population. The expected normal F_2 recessive expression. However, if all disomics in a fair sample of a given family show the character and the monosomics and nullisomics lack it, the chromosome for which the family is aneuploid may be considered the bearer of the gene.

Further evidence may be gained by producing the 21 deficient lines in the variety being tested. This is done by using the experimental variety as the recurrent male parent and backcrossing to the monosomic hybrids until reasonable homozygosity is obtained. The final monosomic hybrids are selfed and the effects of varying doses of the chromosomes are noted. If trisomics occur in the course of this program, as sometimes happens, tetrasomics can be produced by selfing and dosages from 0 to 4 studied. In this way, hitherto unsuspected genes can be located and their effects made known.

The third method is that of transferring intact chromosomes from one variety to another. The deficient aneuploid lines which are to receive the substitute chromosomes are used as the female parents. The donor variety and the succeeding monosomic hybrids are used as male parents in the backcross program. Monosomics of the final backcross generation are selfed and the substituted disomic lines are compared with one another and with the normal recipient variety.

The last method may be used to advantage in studies dealing with characters for which reliable readings cannot be made on a single plant, since it provides uniform populations for testing. Insect resistance is an example. The method also offers opportunities for linkage studies, which are normally difficult in hexaploid wheat. Ultimately, when the genetics of wheat has been adequately studied, substitution may be expected to become a useful method of plant breeding, enabling the breeder to build into his varieties the genes he wants.

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INFLUENCE OF WHEAT VARIETIES ON THE SEX RATIO OF THE WHEAT STEM SAWFLY, *CEPHUS CINCTUS* NORT. (HYMENOPTERA: CEPHIDAE)[1]

By C. W. FARSTAD,[2] A. W. PLATT,[3] *and* A. J. MCGINNIS[2]

The wheat stem sawfly, *Cephus cinctus* Nort., is a plant parasite that lives within the stem. Though it originally attacked the hollow-stemmed grasses of the western plains, it is now one of the more serious pests of the prairies wheat crop. The egg is laid within the lumen of the wheat stem in the early summer. Hatching occurs a few days after oviposition, and the larva begins feeding on the plant tissues. The larva feeds up and down the stem, tunneling through the nodes as it reaches them. By the time the wheat ripens, the larva is mature and it moves to the base of the stem. Here, close to ground level, it girdles the inside of the stem, plugs the upper part of the stub with frass, and spins a delicate cellophane-like hibernaculum, within which it lies dormant over the winter (1). The following spring the larva becomes active and passes through prepupal and pupal stages before finally emerging as the adult. The adult lives but a few days. Hence, for more than 11 months of the year, the sawfly is contained within the stem of the host plant. This insect, then, differs from many plant parasites in that it is obliged to pass from the egg to the adult stage within a single stem, having no chance to escape from an unfavourable environment.

This feature is important from two points of view. First, it is difficult to study the immature insect in its natural environment, and it is equally difficult to rear it under artificial conditions. Second, from the ecological and physiological viewpoints, because of the intimate association between the parasite and the host plant, the influence of the host plant in determining certain features of the parasite is great. On this basis the size and thrift of the wheat plant affect the percentage survival, vigour, size, and reproductive capacity of the adult. It was this close relationship between the parasite and the host plant that prompted the development by Platt and Farstad of Rescue wheat, a solid-stemmed, sawfly-resistant variety (8).

During the development of Rescue wheat the sawflies emerging from the various lines and varieties were observed. The workers found that the sex ratio of populations from a single variety was relatively constant, but marked differences were noted in the sex ratios of populations emerging from different varieties. After these observations, more careful studies confirmed the original findings. A brief summary of field results is presented in Tables I and II.

TABLE I
Summary of 5 years' data on the sex ratios of populations of *Cephus cinctus* Nort. that emerged from 4 wheat varieties at 4 nurseries in Saskatchewan, 1943-1947

	MALES/FEMALES			
	Regina	*Scott*	*Shaunavon*	*Swift Current*
Apex	0.90	0.95	0.92	0.97
4191	2.61	1.60	2.30	2.40
Red Bobs	0.55	0.39	0.50	0.52
Golden Ball	0.27	0.21	0.09	0.23

[1]Joint contribution from the Division of Entomology, Science Service, and the Cereal Division, Experimental Farms Service, Department of Agriculture, Ottawa, Canada. Presented as part of a symposium on "Selective Breeding of Plants and Insects for Pest Control" under the chairmanship of C. W. Farstad and A. Wilkes.
Contribution No. 2691, Division of Entomology.
Contribution No. 154, Cereal Division.
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[3]Cerealist, Dominion Experimental Station, Lethbridge, Alberta.

TABLE II

Yearly sex ratios of populations of *Cephus cinctus* Nort. that emerged from 4 wheat varieties in a nursery at Scott, Saskatchewan, 1943-1947

	Males/Females				
	1943	*1944*	*1945*	*1946*	*1947*
Apex	1.10	0.87	..	0.60	0.99
4191	1.44	1.18	12.00	1.19	2.00
Red Bobs	0.48	0.32	0.57	0.23	0.32
Golden Ball	0.17	0.23	0.47	0.50	0.33

Recently studies have been initiated on sex determination and varietal influence. It has been demonstrated that the sawfly can reproduce parthenogenetically (5). Further, cytological examination of a limited population of the wheat stem sawfly has shown that the female is diploid and the male haploid (9).

Brunson (2, 3,) has shown that the female of *Tiphia popilliavora* Rohwer is capable of selectively fertilizing the egg during oviposition. In the wheat stem sawfly, perhaps selective fertilization is responsible for the anomalous sex ratios. The stimulus for fertilization would thus be supplied by the host stem.

Another possibility lies in the genic balance concept supported by many workers. It has been proposed that a number of sex-determining factors, both male and female, are operative within the individual prior to the manifestation of sex (4, 7). The sex of the individual is determined as a result of the balance struck between these factors. Basic to the activity of these factors with respect to the determination of sex are the nutrition and the immediate environment of the organism. If, then, the environment can be altered in some manner to favour those factors operative in producing one or the other sex, the sex ratio may be altered accordingly. Because the chromosome number varies with sex in the wheat stem sawfly, it is difficult to accept this concept as an explanation of the diverse sex ratios.

Differential mortality between sexes has also been shown to produce anomalous sex ratios (6). Assuming that some condition within the host variety is detrimental to one of the sexes, it is possible to account for the diverse sex ratios in populations of the wheat stem sawfly. As yet there is no proof that differential mortality is responsible, and it is likely that further work will show that more than one mechanism is involved in producing these anomalous sex ratios.

To date, resistance as exhibited in Rescue wheat is associated with solidness of the stem. The situation with which the variations in the sex ratio are associated provides another possibility in resistance. A male-inducing variety, if such can be produced, should be expected to reduce population numbers. Such a variety would offer another means of effective resistance to the sawfly in the prairie wheat fields.

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NEW DEVELOPMENTS IN BREEDING OF PEAS FOR RESISTANCE TO THE PEA APHID[1] (HOMOPTERA: APHIDIDAE)[1]

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Since 1933, studies have been conducted in southern Quebec on the relative resistance of certain varieties of canning peas to the pea aphid, *Macrosiphum pisi* (Kltb.). Of the numerous standard varieties tested during the period since the inception of the study, two commercial varieties, Perfection and Champion of England, were classified respectively as susceptible and resistant to aphid infestation. These varieties, after several years of continuous field studies, have been chosen as standards of comparison for the classification of other varieties. (2).

The results obtained in aphid population studies indicated that genetical characters played an important role in determining the relative resistance of a given variety. Therefore, it was thought that the resistant quality of Champion of England would be transmitted by crossing it with another variety, Lincoln, for the purpose of producing a hybrid that would embody aphid resistance, good canning qualities and abundant yield. As a result the promising hybrid No. 103 was developed.

The following are some genetical characters of peas, grouped as dominant and recessive, with the classification of each of the varieties. Champion of England and Lincoln shown in brackets.

Dominant	*Recessive*
(1) Tall growth (Champion of England)	Short growth (Lincoln)
(2) Yellow cotyledons (Lincoln)	Green cotyledons (Champion of England)
(3) Smooth seed	Wrinkled seed (Champion of England and Lincoln)

In the generations produced from the cross pollination of Champion of England with Lincoln, there were plants that possessed desirable characters, some dominant, some recessive. These characters were maintained by a careful selection and by the elimination of pure line dominant and recessive subjects, leaving the most desirable plants for further selections. The single-plant selection method, as developed and applied in Wisconsin (1), proved to be very practical, and at the sixth generation a hybrid was obtained that embodied the qualities desired.

Hybrid No. 103 inherited desirable qualities as follows:—

Quality	*Inherited from*
(1) Abundant yield	Lincoln
(2) Long, curved pods with 7 to 10 peas	Lincoln
(3) High sugar content in green peas	Champion of England
(4) Evenness of maturity	Lincoln
(5) Resistance to the pea aphid	Champion of England
(6) Vigorous, medium vine length	Champion of England and Lincoln
(7) Intermediate season maturity	Lincoln

These qualities, as determined in 1942 by the writer with the aid of an experienced canner, make the new hybrid No. 103 most promising for use in the canning industry. Four other strains from the original stock were selected in 1941, but they were all slightly inferior in some respects to hybrid No. 103 for canning requirements.

[1]Contribution No. 2692, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada. Presented as part of a symposium on "Selective Breeding of Plants and Insects for Pest Control" under the chairmanship of C. W. Farstad and A. Wilkes.

Resistance of hybrid No. 103 to the pea aphid was first tested in 1942 in comparison with the susceptible variety Perfection and the resistant variety Champion of England. Field observations indicated that the hybrid carried a small population of aphids throughout the season. Aphid counts during July confirmed the field observations and showed that hybrid No. 103 was about half as resistant to aphids as its parent Champion of England in comparison with the susceptible variety Perfection. The results from 180 plant samples of each variety under test are given in Table I.

TABLE I

Mean and relative populations of the pea aphid per plant sample for each of three varieties of canning peas. St. Jean, Que.

Variety	*Test year*					*Mean*	*Relative Populations*
	1938	*1940*	*1941*	*1942*	*1944*		
Perfection	30.9	18.0	77.8	31.7	84.4	48.5	100
103	——	——	——	10.8	31.5	21.1	43.5
Champion of England	8.7	4.4	8.8	5.8	14.5	8.4	17.3

The average population of the pea aphid on hybrid No. 103 was 43.5 per cent and that on Champion of England was 17.3 per cent of that on Perfection. In other words, hybrid No. 103 harboured 56.5 per cent fewer aphids than Perfection and 26.2 per cent more than Champion of England under identical conditions. From this first test, the hybrid may be classed as resistant.

Variety tests for general desirability were carried out at Macdonald College in 1947 and 1948 under the supervision of Professor H. R. Murray, Department of Horticulture. Canning tests were made in 1943 and 1944 by Canadian Canners Limited, St. Isidore, Que. In all these tests for general desirability and canning, hybrid No. 103 maintained a high level of quality. In 1948, hybrid No. 103 was given the variety name of Laurier.

Work is now under way at the St. Jean laboratory, concerning varietal resistance to the pea aphid, on nutritional constituents such as amino acids and sugars in the plants at different stages of growth (3). This biochemical study offers considerable promise. Significant quantitative differences in certain nutritional compounds in various varieties of peas constitute the basis for more advanced research on plant resistance of peas to the pea aphid.

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STUDIES IN THE BIOLOGY AND CONTROL OF THE SWEETCLOVER WEEVIL (COLEOPTERA: CURCULIONIDAE) IN MANITOBA, 1945-1949[1]

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The sweetclover weevil, *Sitona cylindricollis* Fahr., was first taken in North America at Hemmingford, Que., in 1924 (1). It has since spread west to the Rocky Mountains and has become a serious pest of sweet clover in Canada and northern United States. A report on its life-history and control in Manitoba was published by Bird (1). Munro (2) published on its biology and control in North Dakota.

Studies during the past five years have given further information on fluctuations in weevil populations, seasonal history, and control.

FLUCTUATIONS IN POPULATION

Shortly after the appearance of the weevil in Manitoba it became evident that it would fluctuate in abundance from year to year. No accurate population estimates were made from 1939 to 1944; but it was recorded as being very abundant in 1939 and 1940, relatively scarce in 1941 and 1942, and increasingly markedly in numbers in 1943 and 1944. Beginning in 1945, accurate population figures have been obtained by random samples on a square-foot basis for (a) adult weevils going into hibernation in the fall, (b) adult weevils coming out of hibernation in the spring, (c) larvae, and (d) the new, emerging generation. Data for (a) and (b) were obtained by sifting soil and surface debris to a depth of one inch; for (c), by sifting soil at depths of 1 to 2, 2 to 3, 3 to 5, and 5 to 7 inches through sieves with meshes of one-quarter and one-sixteenth of an inch; and for (d), by emergence cages covering one square foot. The cages were in the form of cylinders, 14 inches high, and were made of metal, with wire screen ventilators. Weevils were counted and removed every second day by taking off the top of the cage, which served as a lid. At least 25 cages were erected in each of two replicated plots. The populations of the insect at these four stages are plotted in Fig. I.

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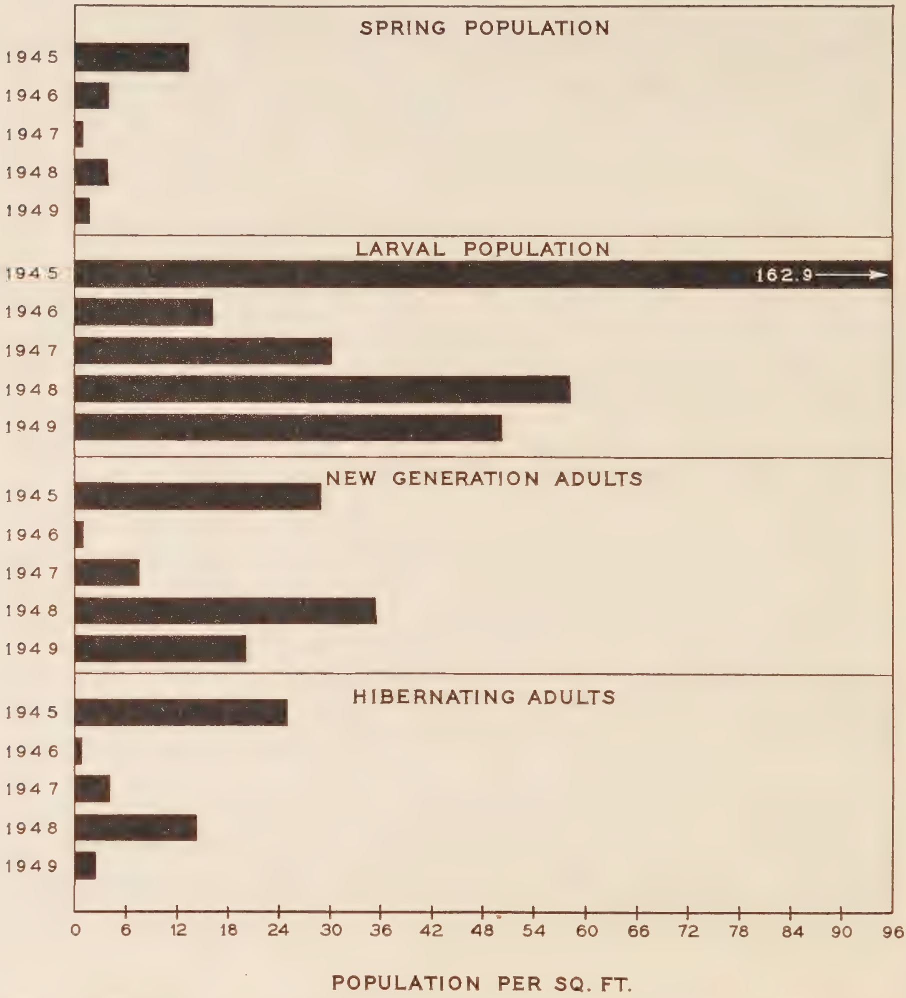

Fig. 1. Fluctuations in sweetclover weevil populations at Brandon, Man., 1945-49 (larval population and new generation, 1947, estimated).

Variations in Seasonal History

The life-history, according to Bird (1), is as follows. Winter is passed in a sexually immature adult state. In the spring the weevils come out of hibernation, feed, mate, and lay eggs on the soil surface. The larvae move down to the roots of sweet clover, where they feed on the root hairs and nodules. They mature in July and emerge as adults in late July or early August. After a feeding period, they go into hibernation in the surface debris and soil when the first frosts occur.

Five years' study has shown considerable variations in the seasonal history. These are best illustrated in Table I. The earliest emergence from hibernation occurred from April 11 to May 5. Dispersal flights took place in April, May, and June and

Table I

Seasonal history of *Sitona cylindricollis* Fahr. at Brandon, Man., in 1945, 1946, 1948, and 1949, and at Graysville, Man., in 1947

Activity and Development	*1945*	*1946*	*1947*	*1948*	*1949*
Earliest emergence from hibernation	April 30	April 12	May 2	May 5	April 11
Dispersal flights	May 22 none in autumn	May 1 to June 2 none in autumn	May 8 none in autumn	All May and Aug. 11-13	April 27
Earliest larva	little before July 2	mid-June	about July 8	June 10	June 4
Earliest pupa	July 16	July 22	July 11	June 24	July 7
Earliest adult, new generation	Aug. 1	Aug. 6	July 23	July 5	July 11
Peak of emergence, new generation	Aug. 11-14	Aug. 13-14	July 28	July 10-15	July 22

in one year in August. The earliest larvae were found from June 4 to July 8, and the earliest pupae from June 24 to July 22. The earliest adult of the new generation appeared from July 5 to August 6, and the peak of emergence of the new generation varied from July 10 to August 14.

Variations in dates of the stages in the life-history may be largely explained by weather. Spring temperatures determine the date of emergence from hibernation; and this date in turn, depending on subsequent weather, is an important factor in the time of appearance of the immature stages and new generation adults. In determining the date of emergence of the new brood, summer weather may be even more important than the dates at which the eggs are laid. In 1948 an exceptionally late spring delayed emergence until May 5, but hot weather in May and June so speeded up development of the immature stages that the first adult appeared at the earliest date on record, July 5.

Soil and direction of slope, too, may affect the seasonal history. In preliminary investigations at Brandon in 1948, the earliest pupae, and the first adults of the new generation, were found 10 days earlier in sandy loam on a southern exposure than in heavy clay loam on the level. Furthermore, only 43.5 per cent of the weevils pupated in the upper two inches of soil in the plot on sandy loam, whereas 74.3 per cent pupated in this layer in the heavy clay loam. This was thought to be due to a greater depth of dry surface soil in the sandy loam. The greatest depth to which the larvae penetrated varied little between sandy loam and heavy clay soils.

Natural Control

Investigations have been conducted at Brandon, Man., to determine egg production, percentage survival from egg to adult, and factors causing mortality.

Seventy-three pairs of weevils caged individually laid from 0 to 1,665 eggs, with an average of 400 per female. Oviposition occurred from early June to late August (1). If one-half of the weevils emerging from hibernation are females, if each lays an average of 400 eggs, and if the numbers of larvae and of resulting adults are known, it is possible to determine in what stages mortality occurs and what percentage ultimately survive for the season. This has been done for 1945 to 1948 and the results

Table II

Mortality of *Sitona cylindricollis* Fahr. during immature stages at Brandon in 1945, 1946, and 1948 and at Graysville, Man., in 1947, on basis of average populations per square foot

	1945	*1946*	*1947*	*1948*
Weevil population in spring	13.00	3.90	9.10	3.90
Estimated number of females in spring	6.50	1.95	4.55	1.95
Estimated number of eggs laid	2600.00	780.00	1820.00	780.00
Number of fourth-instar larvae	162.9	16.0	77.3	57.9
% mortality from egg to fourth instar	93.7	98.0	95.8	92.8
Population of new-generation adults	28.5	1.02	13.5	35.4
% mortality from fourth instar to adult	82.5	93.6	82.5	38.9
% mortality from egg to adult	98.91	99.87	99.27	95.60
Relation of new generation to spring population	119.2% increase	75.6% decrease	48.3% increase	807.7% increase

are illustrated in Table II. There was very severe mortality, from 92.8 to 98.0 per cent, between oviposition and the fourth instar; and a large reduction in population, 38.9 to 93.6 per cent, occurred also between fourth instar and the emergence of adults. The mortality from egg to adult during the four years of study totalled from 95.60 to 99.9 per cent. On a basis of 400 eggs per pair of weevils, a mortality of 99.5 per cent is necessary to maintain a static population.

Mortality from emergence of the new generation through hibernation, and emergence in the following spring, to commencement of oviposition has been determined for 1945-48. In 1945 the population of the new generation was 28.5 per square foot. This was reduced by 13.3 per cent to 24.71 per square foot at hibernation and by a further 84.2 per cent, to 3.90 per square foot, at emergence from hibernation in the spring of 1946. In the springs of 1947 and 1948, siftings were made to determine population and winter mortality as indicated by dead weevils. In these years 0 to 27 per cent of the weevils collected were dead. In 1946 the spring population was determined by the use of emergence cages and siftings were not made to find dead beetles.

Weather — Weather is believed to be the most important natural control factor affecting the abundance of the weevil. Bird (1) stated that the weevils have a long egg-laying period (June to August) but few eggs laid after July 1 produce larvae, and that this was thought to be due to dry surface soil and high temperatures preventing establishment of larvae. Continued observations have supported this hypothesis and show how variations in weather have affected weevil abundance. Depending on the season, all larvae, except in one instance, have entered pupation by some time in July or early August. The fact that no larvae are found later than August in-

dicates a complete mortality of larvae hatching from eggs laid on hot dry soil after early July. Soil surface temperatures as high as 126° have been recorded in July. The one exception has been the finding of fourth-instar larvae at Melita in September, 1948. At this location the soil was kept permanently moist and cool by capillary action from a ground water table only a few feet below the surface. In addition to its effect on the establishment of the larvae, it is believed that hot dry weather also adversely affects the survival of the newly emerged adults which are still in a soft and tender condition as they make their way up through the layer of hot, dry soil to bright sunshine. In 1945, the period when adults were emerging was hot and dry, with the result that there was a great reduction from a very high larval population of 162.9 per square foot to a population of new generation adults of only 29 per square foot.

Fluctuations in population from year to year (Fig. 1) are largely due to weather. The mean weekly temperatures were 1° to 14° below normal from April 8 to July 15 in 1945, a year of high larval population; and they were 3° to 7° above normal for the same period in 1946, a year of low larval population. In 1947, May was dry but June was cool and wet; late July and August were also wet. Moderately high larval establishment and adult emergence occurred in 1947. In 1948, May was moist and early June was dry, but good rains came in late June and continued through August. Larval establishment was higher in 1948, as indicated by an increase of 1,650 per cent from the parent population to the fourth-instar larvae in comparison with an increase of 830 per cent in 1947. In 1949 very hot weather occurred when the new generation was emerging. There was a high adult mortality at this time, offsetting the increased larval population.

Disease — Disease is second to weather in the natural control of the sweet clover weevil. Diseases have been found to attack adults in the spring and the fall. All dead adults found have been preserved and the disease organisms have been determined. The fungus *Beauveria Bassiana* (Bals.) Vuill. was the principal organism. Several species of *Fusarium (F. Scirpi* Lamb & Fautr. var. *acuminatum* (Ell. & Ev.) Wr., *F. Equiseti* (Corda) Sacc., *F. avenaceum* (Fr.) Sacc., and *F. Solani* (Mart.) App. & Wr.) were also isolated. It is not known, however, whether the species of *Fusarium* were responsible for the deaths of the weevils. In the spring of 1945 mortality caused by *B. bassiana* at Brandon was 27 per cent. The decrease in the population from the fall of 1945 to the spring of 1946 was 84.2 per cent. This was thought to be largely due to diseases.

Winter Mortality — Winter mortality, as determined by survey in the spring of 1947, averaged 4.67 per cent for 15 locations, the highest, 20.4 per cent, being at Deloraine. In 1948 it averaged 3.24 per cent for 12 locations, the highest, 18.2 per cent, being at Lyleton.

Cultural Control

Shallow tillage of second-year sweet clover fields after the hay crop is taken off can definitely be recommended as a practical method of control. If such tillage is practised regularly, the grower will protect his seedling crop and have no serious losses from weevil damage. This has been established by four years' experiments in summer tillage. In 1947, ploughing five inches deep gave 98.28 per cent mortality; one-way disking three to four inches deep, 96.01 per cent; ploughing five inches deep plus one-way disking three to four inches deep, 98.58 per cent; cultivating two to three inches deep, 97.36 per cent. The time at which tillage is carried out is important and must not be delayed until emergence has commenced. The date of emergence varies considerably from year to year, from July 5 in 1948 to August 6 in 1946. Generally, however, development of the weevil is correlated with that of the clover. If the clover is cut when it commences to bloom and the land cultivated as soon as the hay is removed, the majority of the weevils will be destroyed. Some

farmers who grow large acreages of sweet clover hay have practised tilling behind the binder and have had very light losses from damage by the weevil, whereas neighbours who have not carried out this practice have had severe losses. There will always, however, be dispersal into newly seeded fields from volunteer sweet clover on roadsides, headlands, and abandoned fields, and some damage will occur if weevils are abundant in the district.

The above methods of cultural control apply only to weevils attacking sweet clover grown for hay. Control methods have not been developed for weevils attacking sweet clover grown for seed.

Summary

Since its establishment in Manitoba in 1939 the sweetclover weevil has shown annual fluctuations in abundance.

Variations of almost a month, apparently due to weather, have occurred in the dates of beginning of various stages in the life-history.

In investigations in 1945-1948, mortality of 92.8 to 98.0 per cent occurred from egg to fourth instar and a further mortality of 38.9 to 93.6 per cent from fourth instar to newly emerged adult, making a total mortality of 95.6 to 99.87 per cent from egg to adult. These mortality rates resulted in a decrease of the population by 75.6 per cent for the highest mortality and an increase of 807.69 per cent for the lowest.

Natural control is primarily due to weather and secondarily to diseases, of which *Beauveria bassiana* (Bals.) Vuill. is the most important.

Weevil populations may be kept at a minimum in fields of sweet clover grown for hay if shallow tillage is practised immediately after harvest of the hay crop.

Acknowledgements

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A. M. Brown, of the Dominion Laboratory of Plant Pathology, Winnipeg, determined the disease organisms.

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A PRELIMINARY REPORT ON THE BIOLOGY OF *PHALONIA HOSPES* WLSHM. (LEPIDOPTERA: PHALANIIDAE), A NEW PEST OF SUNFLOWERS IN MANITOBA[1]

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Introduction

Sunflowers have been grown on a garden-plot scale in Manitoba for about fifty years, the seed being used chiefly for human consumption. During World War II the acute shortage of vegetable oils resulted in the need for increased acreages of oil-

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bearing seeds. This led to the expansion of the sunflower crop to a commercial scale. Since the first commercial plantings in 1943, when 2,500 acres of sunflowers were grown, the acreage has increased rapidly. By 1948, there were 28,000 acres, and in 1949 there were 60,000.

Prior to 1948, sunflowers were grown chiefly in the southern section of the Red River Valley of Manitoba, mainly near Altona, where an oil-extraction plant was established in 1946. In 1948 and 1949 this area has been extended north and west, and, in addition, a new sunflower area has been established in the municipality of North Norfolk. Isolated fields are also scattered throughout the Province.

Two species of *Phalonia*, namely, a species allied to *P. lavana* Bsk., and *P. hospes* Wlshm., attack sunflowers in Manitoba. The former was reported by Allen (1) in 1944. A species of *Phalonia* was again reported in 1946 (2), and since that time populations have increased materially. In 1948 and 1949 the over-all seed destruction caused by *Phalonia* spp., as indicated by a survey of the entire area, was 1.7 and 3.5 per cent. respectively. In some of the most severely infested fields, in 1948, seed destruction was estimated at 40 per cent.

This report deals with *P. hospes*. The investigations were begun in 1948 and carried on intensively in 1949, and are the basis for this preliminary report.

Description and Habits

Adult. The moth has a wing expansion of about 13.5 mm. The fore wing is straw-coloured, with a dark-brown, roughly triangular area in the median portion of the wing, the apex of the triangle being toward the costal margin and the base of the triangle along the posterior margin of the wing. Distal to this area there is a smaller and less well defined brown subapical area. The hind wing is light grey-brown and bears no distinctive markings.

The moths are nocturnal and are strongly attracted to light. They become active at twilight and fly about freely from field to field. During the day they remain quiet, resting on the undersides of the lower leaves of the sunflower plants or on other objects. When disturbed they flutter from plant to plant.

Egg. The eggs are oval and somewhat flattened, and have reticular markings. They are about 0.45 mm. in length and 0.29 mm. in width. When laid they are white but they gradually change to light-brown on maturing. Just prior to hatching the dark head capsule of the larva becomes distinctly visible.

The eggs are deposited singly on the bracts of the sunflower head, the greatest number being laid on the outer whorl of the involucre of bracts. Under cage conditions eggs have also been found on leaves near the head of the plant.

In selecting heads for oviposition the moths show a preference for heads that are at the stage of growth just prior to flowering. Heads in early bud stage or past flowering are less frequently chosen for oviposition. The reason for this preference is indicated by the study of the larval feeding habits.

Larva. The newly hatched larvae are white, and about 1.0 mm. in length. The head capsule is dark-brown, and the cervical shield and the anal plate are distinct but somewhat less pigmented. After the first moult there is a gradual change in colouration to light-pink or yellow, then to reddish or purplish, and finally to green at maturity. They are fully developed after 5 instars, the full-grown larvae being about 10.0 mm. in length.

The newly emerged larvae move from the bracts to the florets of the sunflower head, where they enter open florets to feed on the pollen. In instances in which the eggs hatch prior to the opening of the florets, the young larvae fail to become

established, since early feeding must take place on the pollen within the florets. Similarly, larvae that emerge subsequent to the blooming stage of the plant also fail to become established. The period during which any sunflower head is liable to infestation is, therefore, limited to the flowering period of the plant. This is usually from a week to 10 days, depending on weather conditions.

The larvae feed in the florets until the third instar. During this stadium the insect tunnels through the base of the floret into the seed. In a short time the larva may consume part or all of the contents of the seed, and while the seed coat remains soft the larva is able to tunnel through the soft walls to feed on adjacent seeds. However, when the seed coat becomes hard, the larva usually enters near the top of the seed and leaves by way of the same puncture after the contents are eaten. Each larva, therefore, may destroy several seeds.

Pupa. In the fall the larva enters the soil, where it spins a cocoon. It remains in this cocoon throughout the winter and spring, pupation taking place in late June. Just prior to pupation the larva punctures one end of the cocoon. Pupation may then occur within the cocoon, or the larva may leave the cocoon before it pupates. In either case the pupa works its way near or to the soil surface before the emergence of the moth. The pupa is dark-brown, and about 6.0 mm. in length.

Seasonal History

From late August to the end of September the larva, in the fifth, or last, instar, leaves the sunflower head and enters the soil near the base of the plant, to a depth of about 2 inches, and there it spins a cocoon. In this stage the insect overwinters, the larva remaining inactive within the cocoon until pupation takes place.

Pupation begins in late June, and the pupal period, as determined in the laboratory, is about 12 days. The adults begin to emerge early in July, and emergence may continue over a considerable period. In cages, emergence occurred as late as August 26.

Egg laying begins about July 15 and continues for about 6 weeks. No eggs were found in the field after August 25. However, moth flight continues until about the end of August, a period of about 2 months. The eggs hatch within 5 to 8 days, and the larvae immediately move to the florets of the sunflower head.

Although oviposition continues over a long period, the larvae in any individual head are usually within 1 or 2 instars of the same stage of development. This is due to the short period during which the head is susceptible to infestation. However, in any field, larvae may be found in all stages of development because heads within it do not all bloom at the same time. Late-flowering heads, which are usually small, are often severly infested, as they are the only heads that remain suitable for larval establishment late in the season.

About 3 weeks are required for the larvae to reach the fifth instar. The duration of the fifth instar was not determined.

All larvae except those in late heads enter the soil for hibernation by mid-September, and by the end of the month the late larvae also leave the heads.

P. hospes has only one generation each year in Manitoba.

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THE NORTHERN INSECT SURVEY IN CANADA AND SOME ENVIRONMENTAL OBSERVATIONS[1]

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The Northern Insect Survey was inaugurated in 1947. It represents a joint project of the Defence Research Board, Department of National Defence; and the Systematic Unit, Division of Entomology, Department of Agriculture, Canada. Several other organizations co-operate in the activities, chiefly the Unit of Household and Medical Entomology, Division of Entomology; the Division of Botany and Plant Pathology, and a few Canadian universities. The Survey gives some assistance to the divisions of Bacteriology and Chemistry, Department of Agriculture, Canada.

Survey parties have been dispatched to widely distributed localities across northern Canada in order to obtain a general biological picture, with emphasis on insect life, of areas representative of the major life zones. These zones, on the basis of Halliday's forest classification, are the northern coniferous forest; the northern transition zone; and the arctic tundra, commonly referred to as the barren lands. These surveys have been conducted at 20 different localities from Newfoundland to the Alaska boundary and north to approximately latitude 75° at Cornwallis Island, a locality which approaches the southern limit of the continuous northern ice pack.

The objectives of the Survey are twofold: first, to study the systematics and biology of biting flies; second, to make general collections of insects to increase the knowledge of the insects of northern Canada.

Cryptic species occur among the biting flies. A characteristic of this species complex is that the external anatomy of the various species is similar or identical. The taxonomist, therefore, must resort to a study of the behaviour of populations to ascertain their characteristics. It follows that a study of behaviour involves a study of general biology and such a study is fundamental to a satisfactory control of these organisms.

It is impossible to divorce ecology from taxonomy. One must realize that all organisms are merely component parts of a whole organic assembly. Therefore, a study of any one group naturally involves a knowledge of the whole. The ecological observations made in the North have shown the gradual changes in plant and animal life from the tree-covered areas, north through the transition zone, to the barrens. It is this ecological diversity that I wish to discuss.

In the northern coniferous forest one finds a dense growth of black spruce, scattered white birch, and huge sphagnumheath muskegs. Trembling aspen, alder, and common shrubs are well established. There appears to be considerable latitude in environment, and sufficient time has elapsed since the latest glaciation for the establishment of many definite plant and animal habitats. The northern coniferous forest contains an extensive flora and fauna. Mosquitoes are represented by 28 species, belonging to 7 genera. Papilios are represented by 2 species, and many other butterflies attain their northern limit of distribution.

As one proceeds north to the transition zone, the number of definite habitats becomes considerably fewer. This zone is characterized by large areas of rather dry, ochre-yellow lichen, commonly called caribou moss. The trees are mainly spruce and larch and are considerably stunted. Granitic and sedimentary rock outcroppings are numerous. This region contains biological elements of the boreal forest as well as a few of those of the treeless area, the northern plains. This transition zone marks the northern distributional limit of tabanids and dragonflies. Mosquitoes are represented

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by approximately 12 species, belonging to 2 genera, and the number of species of most of the major insect groups has diminished. The environment begins to show clearly its effect on organic development and distribution. The environment of this region may be subdivided into different habitats only with difficulty. As one proceeds north to the edge of the timber line the trees become even more stunted and it is not unusual to find isolated spruce trees with their branches developed only on the southern side. Prostrate trees occur frequently; they either assume the form of a small shrub or trail along the ground like a vine. The timber line, according to some authors, coincides with the 50° F. isotherm for the warmest month of the year. Other investigators consider that a dearth of soil and insufficient time since glaciation are the limiting factors of tree distribution. The ochre-coloured lichens persist slightly beyond the trees, and, particularly when situated in the depressions among the eroded granitic outcroppings, they are very characteristic of the area. Also, the *Carex* meadows, which are so typical of the barren lands, begins to appear here.

As one proceeds north the loose, drifting pan ice and occasional icebergs are encountered near the coast of the vast treeless plain. The effect of the environment on the organisms of this region becomes more apparent. Vast *Carex* meadows are characteristic and they separate rocky ridges or sandy or gravelly moraine and eskers. In the *Carex* meadows it is extremely difficult, if not impossible, to define the habitats because sufficient time has not elapsed since glaciation to enable one plant to become dominant in a particular locality. This condition likewise governs insect distribution, and the number of insect species drops to about 10 per cent of those indigenous to the tree-covered areas to the south. The insects of this region are usually specifically different from those of the coniferous zone. Diptera comprise the bulk of the insects both in numbers of species and in numbers of individuals. Lepidoptera, Coleoptera, and Hymenoptera are the next best represented orders and occur in about equivalent numbers. Hemiptera, Neuroptera, and Plectoptera are poorly represented. Collembolla are numerous in numbers of individuals. Spiders are abundant. Mosquitoes are represented by 3 species, belonging to 1 genus; tabanids do not occur; and black flies, although present, do not usually annoy humans. No biting flies, and very few Lepidoptera, occur on Cornwallis Island, presumably because of the low summer temperature. Higher temperatures occur north of this locality as far as northern Ellesmere Island, where Lepidoptera at least are rather abundant.

The barren lands present a rosy-coloured aspect as well as a frosted one. The first is characterized by extremely colourful and gigantic rock gardens with myriads of arctic flowers which are not found in any other region in North America. Rose-coloured rhododendrons and saxifragas, white *Dryas* and *Cassiope*, and the bright-yellow arctic poppies present a colourful splendour which is truly amazing.

The frosted aspect of the barren lands is typified by huge icebergs, snowdrifts, and glaciers. The icebergs form many weird shapes. Some resemble mushrooms, flat-tops, Old Mother Goose, or dunce caps; others have caverns large enough for a small boat to pass through.

The environmental pressure has been exerted so strongly on all the organisms indigenous to this region that their adaptation to that environment is particularly striking. Camouflage among animals and birds becomes almost a rule. The mottled plumage of a nesting ptarmigan is almost indistinguishable from the lichens and grasses surrounding the nest, and the white plumage of this bird in the winter is equally protective. Other examples of animals exhibiting camouflage are Parry's ground squirrel, the white whale, the caribou, the fox, and the wolf. The environmental pressure is also strongly exerted on those Eskimos who have maintained their original mode of life. These people were originally a component part of the biological community and were adapted to, and governed by, the rigorous environment. Many of the Eskimo women are sterile or partially so. This condition may be explained on the

premise that those parents with large families were more subjected to starvation, whereas those with small families suffered less privation and were thus successful in maintaining the race. This would result in the maintenance of partial sterility genes in the population.

The Eskimo dog is also adapted to the environment and is accustomed to eating only twice a week. Throughout the North, "husky" refers to the Eskimo himself and the dog is therefore called the husky's dog.

The coppery reflections of the midnight sunset provide an ideal atmosphere for meditation on the effect of the environment on the organisms. In conclusion, I should like to leave the reader with the thought that the forces which govern life lie mainly without rather than within the organism.

METHODS OF REARING AND SEXING *(MUSCA DOMESTICA L.)*

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Part I—Rearing Method

The need for test animals of uniform size, age, vitality and sex has led to a number of studies of laboratory methods for rearing the common housefly. Among the most recent of these are studies by Basden (1) and by Wilkes et al (3). These only serve to point up a lack of standardization in the methods now in use. Hafez (2) published a note on rearing houseflies on a milk medium but supplied no detail or data on results. The method to be described here is based on Hafez's plan but a standardized scheme is presented along with some data on the results of its use.

Adult flies are kept in breeding cages 18 inches by 12 inches by 12 inches with wire screen on three sides and one end, and a cotton sleeve one foot in length on the other end. The floor is of wood. In each cage there is a watering fountain consisting of a bottle of water set upside down in the bottom of a petri dish in which a layer of cotton wool has been placed, a supply of dry granulated sugar, and a dish of dry powdered milk. Each morning the oldest stock of breeding flies is killed off by putting the cage into an oven and heating it. The cage is then cleaned and restocked with newly emerged flies.

On the evening of the second day after stocking a dish of crumpled paper towelling moistened with milk is introduced into the cage. In the centre of this oviposition dish or saucer is fastened with deKhotinsky cement a tiny vial open at the top into which a drop or two of ammonia water may be placed to incite oviposition. This oviposition dish is removed the next morning (the third morning after restocking) and eggs collected. The paper towelling is renewed and the dish replaced that evening. This procedure is repeated on the following morning and evening. Thus oviposition dishes are present during the third, fourth and fifth nights after stocking, similarly such dishes are present in three cages each night and a daily supply of eggs is assured. The following table shows how six cages are made to serve the purpose.

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The letters A, B, C, ... F indicate cages.

——indicates the presence of an oviposition dish in that cage overnight.

Sun.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.	Mon.	Tue.	Wed.	Thur.
A	A	A	——A	——A	——A						
	B	B	B	——B	——B	——B					
		C	C	C	——C	——C	——C				
			D	D	D	——D	——D	——D			
				E	E	E	——E	——E	——E		
					F	F	F	——F	——F	——F	
						A	A	A	——A	——A	——A

The eggs are washed from the towelling with a stream of distilled water from a wash bottle and collected in a beaker. The excess of water is decanted off and the egg suspension poured into part of a graduated ten millilitre pipette which has been cut off and sealed flat on one end. When this is firmly tapped down the writers count an average of 600 eggs per 0.1 millilitre. (The numbers depend on the consolidation Basden (1) points out that in the Peet-Grady method 0.1 ml. is considered to contain 500 eggs, whereas his counts showed about 700 in the same volume.) This suspension of 600 eggs is then added to 4 ml. of milk and 2 ml. of the diluted suspension added to each culture with a 1 ml. pipette. Thus approximately 300 eggs are used in each culture.

The larvae are reared in pint milk bottles with 64 layers of absorbent cellulose cut round and fitted into the bottom of each bottle and 60 ml. of pasteurized, homogenized milk added. The bottle is stoppered with a cotton plug and the culture kept at a constant temperature of 80 degrees F$\pm$ 1 degree. Thermographs record the constancy of these conditions. It has been found advisable to autoclave the stoppered bottles with the absorbent cellulose in them before the milk is added; also to sterilize all pipettes, beakers, and measuring flasks to reduce the danger of mold spores getting into the cultures. The eggs hatch in a few hours and the larvae burrow rapidly through the milk pad. At the end of three days nearly fullgrown larvae begin to crawl up the sides of the bottle. Dry bran is then added to a depth of two inches on top of the milk pad. The pupae are formed in this bran. Bran and pupae are readily poured out of the bottle and easily separated in an airblast which blows away the light bran leaving the pupae perfectly clean. The pupae are allowed to dry for an hour in an open container then covered loosely. When emergence is imminent the pupae may be placed into the emergence chamber of the sexing apparatus or in a breeding cage to be newly stocked.

Using this method over a period of 18 days, 53 cultures were reared and the following data recorded.

Duration of larval stage 3 to 5 days. Duration of pupal stage 4 to 5 days. 12 cultures yielded between 100 and 150 pupae each. 31 cultures yielded between 150 and 240 pupae each. 10 cultures yielded between 250 and 300 pupae each. These numbers were estimated by weighing the whole yield from each culture and counting the number of pupae in a 1.5 gram sample. When cultures yielded 150 to 240 pupae the number per 1.5 gram sample varied from 57 to 74, i.e., the average pupal weight was 22 milligrams.

The following refinements narrow the range of pupal weight: (1) Separating the pupae early and discarding the late maturing larvae which yield small pupae. (2) Using eggs from a few masses collected over a short time interval. (3) Avoiding molds in the cultures by sterilization of equipment.

It is the opinion of the writers that this method of housefly culture has the following advantages: (1) The medium is clean to handle and relatively free from disagreeable odour. (2) Flies may be produced in small or large numbers as desired. (3) Very uniform pupal samples can be easily selected. (4) The operator has comparatively good control of temperature conditions at all times. Fermentation in the small bottles of medium never raises the internal temperature to more than 2 degrees C. above the

temperature of the rearing chamber, and very seldom to that extent. (Wilkes et al (3) noted that wide temperature variations in large masses of fermenting medium make uniform flies difficult to produce.)

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PART II—SEXING METHOD AND APPARATUS

There is likewise a need for a rapid method of sorting out houseflies into the two sexes since the sexes vary in susceptibility to different poison and comparable tests must be based on one sex or equal sex ratios. The following method does away with the use of anaesthetics as described by Basden (1).

Pupae from which adults are about to emerge are placed in the emergence chamber (Fig. 1, A) of the sexing apparatus. This compartment has the light excluded by its solid wall and dark curtain over the screened end (Fig. 2, a). The other end tapers funnel-like into an opening which just admits a glass tube or tunnel of 5 mm. bore Fig. 1, B). (It would be still better if the bore of this tunnel were oval or even triangular in cross section with the wider, flatter surface down). Just beyond the funnel end of the emergence chamber a small metal gate (Figs. 1 & 2, e, e', e") is set into the tunnel like a damper in a stove pipe. This damper is cut from copper and a needle-like extension protrudes through a hole bored or blown in the top of the tunnel. A small cork stopper pushed into the projection serves as a control button. Turning this damper-gate parallel with the tunnel allows a fly or flies to pass out; turning it across the tunnel closes the exit.

A few centimetres beyond the gate the tunnel takes a slight jog (Fig. 2, f) to one side and then straightens out again. A small glass tube is attached at the point where the tunnel resumes its straight path so that the tube opens into the tunnel in the direction of the receiving chambers and extends back toward the emergence chamber (Fig. 2). On the protruding end of this tube is a small syringe bulb (Fig. 1, E) with which a puff of air is directed forward into the tunnel to assist each fly on its way. The same air blast sets up a back pressure which arrests momentarily the process of the fly and prevents confusion.

Beyond the entrance of the syringe tube the 5 mm. tunnel enters a glass Y-tube of 1 cm. internal diameter (Figs. 1 & 3, D). One branch is 3 inches long, the other to which the supporting clamp is fixed 5 inches long. Each enters a small cloth covered receiving cage via a cotton sleeve. A second gate (Fig. 3, j) is set where the Y forks in such a way that either passage may be closed off and the other left open. A 50-watt light placed centrally with regard to the arms of the Y and 6 inches above the receiving chambers, serves as the attractant force for the dark conditioned flies. The tunnel from the funnel to the Y is set 1 inch above 2 flat strips of mirror, 2 inches wide and 6 inches long (Fig. 1, C), one placed horizontal and the other at an angle of 30° from it. Thus the operator may, regardless of the position of the fly, readily see the ventral side of each as it progresses, determine its sex and direct it to the correct chamber. The speed of fly movement is regulated by the first damper-gate and blocking prevented by a propellant blast from the syringe bulb. An experienced operator can sex 1,800 flies in one hour.

Sexed flies are kept in the cloth covered receiving cages which are 9 inches by 5 inches by 5 inches, with a sliding glass window front and a tray bottom removable

by way of a small sleeve below the front window. Two tubes of water joined by a cotton wick, granulated sugar and powdered milk are kept in the tray of each cage.

References

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Legend

A (fig. 1 & 2) . . *emergence chamber*
B (fig. 1 & 2) . . *observation tunnel*
C (fig. 1) . . . . . . *mirrors*
D (fig. 1 & 3) . . *Y-tube*
E (fig. 1 & 2) . . *rubber bulb*
a (fig. 1) . . . . . . *screen*
b (fig. 2) . . . . . . *cork ring*
c (fig. 2) . . . . . . *cork stopper*
d (fig. 2) . . . . . . *glass funnel*
e (fig. 2) . . . . . . *gate*
e′ (fig. 2) . . . . . . *gate (front view)*
e″ (fig. 2) . . . . . . *gate (side view)*
f (fig. 2) . . . . . . *entrance of side arm for air blast*
g (fig. 2) . . . . . . *intake valve on rubber bulb*
h (fig. 1 & 3) . . *support clamp*
i (fig. 1 & 3) . . *gate lever*
j (fig. 1 & 3) . . *copper gate*
k (fig. 1) . . . . . . *blackened part of funnel*
l (fig. 3) . . . . . . *pivot point for gate.*

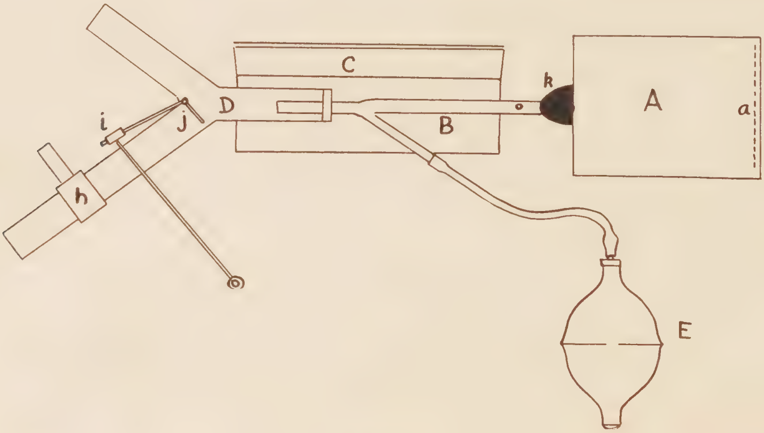

Fig. 1

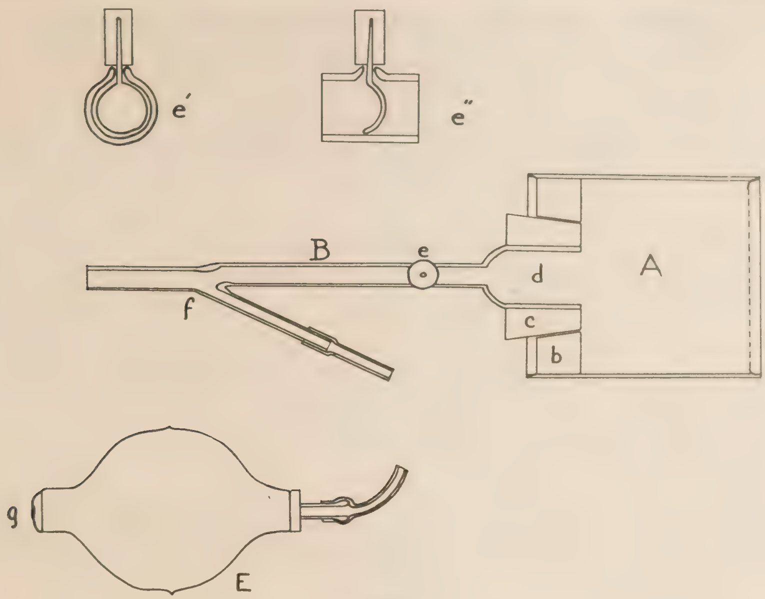

Fig. 2

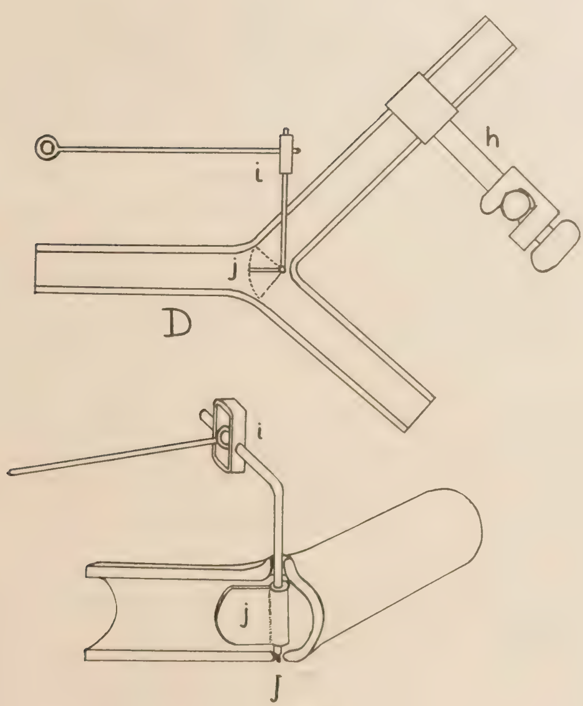

Fig. 3

EFFECT OF HORN FLIES ON PRAIRIE CATTLE

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Introduction

One of the major livestock pests in Western Canada is the Horn Fly *(Siphona irritans* (L.) It main host is cattle.

Recent reports from other locations have indicated increased weight gain in cattle when the Horn Fly is controlled. The Research Department of the Green Cross Insecticides Division of the Sherwin-Williams Company of Canada, Limited, and the Dominion Livestock Insect Laboratory at Lethbridge, Alberta, undertook jointly to study the effect of the Horn Fly on Canadian livestock.

In the Interlake area of Manitoba, the major enterprise of farmers is livestock. Natural conditions favour farms of moderate size with herds of 100 to 200 head of dual-purpose cattle. These circumstances, therefore, permitted an investigation into both weight gains and milk flow in the same herds.

The co-operation of two farmers was obtained. Their property was adjoining but natural boundaries and fences did not permit the herds to come within 1½ miles of each other. All conditions were equal for the two herds, except the breed. Grazing, feed, watering and wintering conditions of the two herds were identical.

One herd consisted mainly of pure bred Shorthorn stock. The other herd consisted largely of first generation Hereford X Shorthorn crosses. Shaw & MacEwan[1] found that there was a definite advantage in favour of first generation crosses. Some expression of hybrid vigour was, therefore, expected but it was planned to overcome this by expressing weight increase in terms of percentage increase over spring weight.

Materials and Method

The experiment was actually in three parts with separate objectives and each will be outlined separately.

There was no way of knowing if there was an average Horn Fly population present. To obtain some measure of the population the farmer co-operators and their neighbours were asked if there was an average Horn Fly population present. Without exception, all answers indicated the Horn Flies were not as numerous as could be normally expected.

At the time this work was undertaken, D.D.T. was in common use for Horn Fly control and was, therefore, used in this experiment. It was considered that any weight increases would result from fly control rather than from any other effect the D.D.T. would have. Therefore, barring detrimental effects, any other insecticide which gives equivalent control can be substituted and the same results expected.

I. Effect of Horn Fly on Seasonal Weight Gain. The necessary holding corral, handling chutes, and scale were constructed and set up. On June 22 and 24, 1948, all the beef cattle were weighed. One herd was sprayed with D.D.T. and designated the test herd. The other herd was unsprayed and designated the check herd. The check herd was handled first so no D.D.T. contamination would be picked up from the handling

[1]Experiment in Beef Production in Western Canada. Scientific Agriculture 19: 4, December 1948.

chute. The animals were individually weighed and marked with a metal ear clip bearing a number, so that each animal maintained its identity throughout the test. Details as to breed, age, sex and ownership were noted.

Immediately after weighing and marking, the test herd animals were sprayed with an aqueous suspension of D.D.T. of a .24% concentration. Application was made at 400 lbs. pressure, using approximately two quarts of the suspension per animal unit. Sprayings were repeated as the owner of the test herd deemed necessary. At the time of retreatment Horn Fly counts were usually around 50 flies per animal on the test herd. Three applications kept the herd virtually fly-free for the summer. Applications were made on June 24, July 13 and August 12, 1948. The first spraying was followed by a week of unusually heavy rain. Final weighing of both herds took place on September 22 and 23, 1948.

II. Effect of Horn Fly on Milk Flow. On June 2, 1948, both farmers began weighing morning and evening milk production. Total production was recorded. Records for individual cows were not kept.

Occasionally milk weights were not recorded. Because time of milking was not always uniform, data used in this report are always averages of three days.

III. Control of Farmstead Insect Pests. Using the power sprayer, the outside of the house, barn, and other outbuildings was sprayed with the same aqueous suspension that was used on the livestock. The interior of the barn was sprayed with a D.D.T. whitewash combination in the following proportions.

Water	60 gallons
50% Wettable D.D.T.	26 lb.s
Lime	60 lbs.

A high pressure sprayer was used for the application of this mixture as well.

Results

I. Effect of Horn Fly on Seasonal Weight Gain. In the case of the beef herds, comparisons were made by age groups. The following tables show average weights of test cattle in each age group.

Table I

Pail Fed Calves

	Check Herd	*Test Herd*
Number of animals used	5	13
Average weight — spring	287.2 lbs.	175.7 lbs.
Average weight — fall	429.8 lbs.	308.1 lbs.
Average weight — increase	142.6 lbs.	132.4 lbs.
% increase over spring weight	49.65%	75.31%
Additional gain expressed as %		25.66%
Additional gain expressed as pounds		73.7 lbs.

Table II

Yearlings

	Check Herd	*Test Herd*
Number of animals used	22	15
Average weight — spring	585.2 lbs.	452. lbs.
Average weight — fall	769.4 lbs.	619.8 lbs.
Average weight — increase	184.2 lbs.	167.8 lbs.
% increase over spring weight	31.47%	37.12%
Additional gain expressed as %		5.65%
Additional gain expressed as pounds		33.1 lbs.

TABLE III

Two-Year Olds

	Check Herd	Test Herd
Number of animals used	13	15
Average weight — spring	862.3 lbs.	751.2 lbs.
Average weight — fall	998.8 lbs.	917.8 lbs.
Average weight — increase	136.5 lbs.	166.6 lbs.
% increase over spring weight	15.83%	22.18%
Additional gain expressed as %		6.35%
Additional gain expressed as pounds		54.75 lbs.

The comparison of the pail fed calves is possibly the least reliable. The milk cows in the check herd were pre-selected because of their high production capacity. As a result, their calves were given considerably more milk than was fed to the calves of the test herd. Five calves do not constitute a satisfactory sample. Some of the calves in the test herd were late and as a result were quite small at the first date of weighing. The results, however, indicate a trend in favour of the spraying with D.D.T. and the resulting control of Horn Flies.

It was noted that two particular calves in the test herd were always the first to be reinfested with Horn Flies. Both of these calves seemed to be favored by the Horn Flies.

The Yearlings offer the best sample. The Two-Year-Olds also offer a fair sample, but because the owner of the check herd sold some of his best cattle in this group before the fall weighing, the results from this group may not be quite as representative as with the Yearlings. The extra weight increase figure for the test herd may be slightly high.

II. Effect of Horn Fly on Milk Flow. The results as expressed in milk production are shown in Table IV. Weight records for certain days are missing. Weights shown in Table IV are the averages of the three days shown and in all instances weights were recorded for each day preceding those indicated. This precaution was taken to avoid abnormal weights which may result from irregular milking conditions. Weights for milk production of check herd are absent for July 11 and July 13, so no weight is shown for that date which just precedes the second spraying. The raw data indicates a gradual decline through this period for the check herd.

TABLE IV

Synopsis of Milk Production

(Figures are average of three dates indicated)

	Average Weight of Milk in Pounds		*% of original Milk Production*	
Date	*Check*	*Test*	*Check*	*Test*
June 7, 8, 9	192.4	434.4	100%	100%
June 19, 20, 21	181.8	427.2	94.5%	98.3%
June 29, 30, July 1	181.0	465.8	94.0%	107.2%
July 11, 12, 13	missing	401.9	missing	92.5%
July 18, 19, 20	145.2	420.8	75.5%	96.9%
July 28, 29, 30	127.3	395.2	66.2%	91.0%
August 11, 12, 13	123.5	350.2	64.2%	80.6%
August 25, 26, 27	101.9	330.8	53.0%	76.1%

The weight figures in Table IV are also converted into percentage. The percentage shown is calculated on the basis of production for June 7, 8, and 9, which is, therefore, 100%. Figure I represents these percentage figures drawn as a graph.

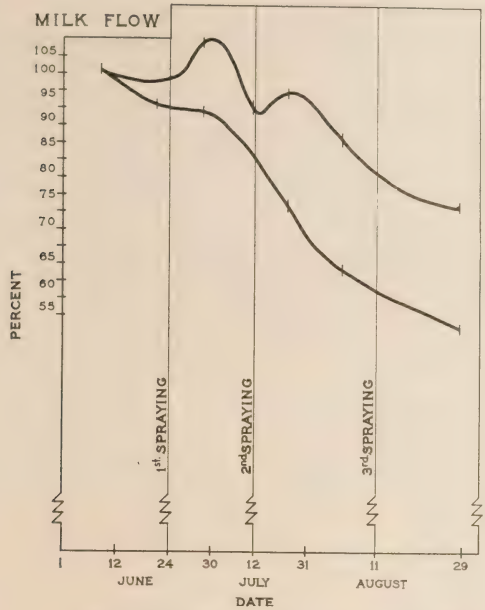

Fig. 1—Upper line represents Test Herd and lower line the Check Herd. Milk flow expressed as percentage of production before application of D.D.T.

The line joining the co-ordinates for the sprayed test herd tells a graphic story. The line for the check herd declines gradually but steadily. Whenever the test herd line crosses a vertical line indicating a spraying, it immediately turns upward, indicating an increased milk flow.

III. Control of Farmstead Insect Pests. Excellent control of farmstead insects such as houseflies, stable flies, mosquitoes, was obtained from one spraying. The D.D.T. and whitewash mixture was highly effective. It is apparently necessary to use a higher concentration of D.D.T. with lime. Besides giving complete freedom from flies, it greatly improved the appearance of the barn. It was found that the high pressure which was caused was very effective in cleaning out dust, cobwebs, and other miscellaneous debris which normally gathers in the farmer's barn.

Cost

The cost of material at list price amounted to ten cents per head. The cost of material for control of farmstead pests was approximately $2.50. This latter figure does not include the D.D.T. used in the whitewash mixture.

Discussion

In the case of weight increases, Cuff (2) reports an additional average weight increase of 73 lbs. per calf from control of Horn Flies in Kansas. Kelly (3) suggests an average additional weight gain of 30 lbs. per animal per summer in Kansas.

The results obtained in this experiment would indicate that similar results can be expected in Western Canada. Statistics indicate a beef cattle population of approximately 6,000,000 head in Canada. This represents a loss of 180.000,000 lbs. of beef due to Horn Flies. At an average price of .17c per lb. this represents a monetary loss of $30,600,000 per year to cattlemen.

2. Ray L. Cuff. National Livestock Loss Prevention Board, "Down to Earth" Vol. 3, No. 2, Fall 1947.
3. Dr. E. G. Kelly. Extension Entomologist, Kansas State College Extension Service, Manhattan, Kansas. "Livestock Insect Control in Kansas".

From the point of view of milk production, the Horn Fly appears to be equally as destructive. Figure I shows the immediate response in milk production to the control of Horn Flies.

The period immediately following the first spraying was marked by heavy rains. In spite of eight heavy rainstorms the D.D.T. persisted for 11 days. The sharp decline following the increase can possibly be attributed to the fact that the D.D.T. did not persist over the entire life cycle of the Horn Fly; hence, reinfestation was severe.

The second application did give protection over the life cycle and later reinfestations were not as severe and, hence, the third application did not result in a sharp increase but rather in a slackening of the rate of natural decline.

Conclusions

1. D.D.T. is very effective for the control of most farmstead and livestock insects.

2. An increase of at least 30 lbs. per head can be expected in the summer weight gains of cattle when beef type livestock is on pasture and free from Horn Flies.

3. An increase of 20% to 25% in milk production can be expected when Horn Flies are controlled.

THE TOXICITY OF HEXACHLOROCYCLOHEXANE TO CERTAIN MICRO-ORGANISMS, EARTHWORMS AND ARTHROPODS

By F. O. Morrison[1]

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The present widespread interest in the effect of any chemical agent on the total faunal-floral-complex makes the following observations of some interest. They were made during laboratory and field studies conducted for the past two years on the phytotoxicity of hexachlorocyclohexane.

Effect on Protozoa

Fifty milligrams of pure gamma hexachlorocyclohexane (courtesy of Industrial Chemicals Incorporated) were agitated with 10,000 ml. of water. Complete dissolution was not obtained even over a period of several hours. When the supernatant liquid from this mixture was added to the extent of 50% of the total volume of a mixed culture of ciliates, no deleterious effect on the organisms could be observed.

What appeared to be true solutions of gamma hexachlorocyclohexane were prepared by making a 1% (wt/vol) solution in 95% ethyl alcohol and diluting with water. Mixtures so made and containing 10 p.p.m. of gamma remained clear but at 100 p.p.m. cloudiness and later precipitation occured. This is in accord with Slade's data (1).

Eight clean petri dishes were partly filled with distilled water, eight with a 10 p.p.m. solution of gamma hexachlorocyclohexane. To each dish was added a small amount of very fine sand and a grain of boiled wheat. Then all were inoculated with living *Amoeba proteus*, covered and incubated. Over a period of weeks all cultures developed normally.

[1]Associate Professor of Entomology, Macdonald College, P. Que.

The Department of Bacteriology, Macdonald College, was supplied on June 3, 1947, with samples of greenhouse potting soil into which hexachlorocyclohexane in the form of a 50% wettable crude (6% gamma) had been incorporated so as to give 0, ½ lb., 1 lb., 10 lbs. and 100 lbs. of gamma isomer per 2,000,000 lbs. of moist soil. Plates were prepared for estimating protozoa in all samples on June 18 and from the 0 and 100 lbs. dosages on July 7. The report of the bacteriologists was that Rhizopoda, Mastigophora and Ciliata were present in dilution of 1:100 in all samples on June 18, but that the amoeba group had been greatly reduced, while on July 17 the Rhizopoda were absent from the highest treatment.

Laboratory hay infusions in which *Paramacium caudatum* predominated were grown in half pint milk bottles. The volume of such cultures was increased by a like volume of solution known gamma isomer concentration as follows:

Conc. of gamma solution added in volume equal to culture volume	*Condition of organisms after 1 hour	15 hours	18 hours	65 hours
0	normal	normal	normal	normal
.5 p.p.m.	slow	normal	normal	normal
2.5 p.p.m.	slow	many dead	a few alive	dead
5 p.p.m.	slow	dead	dead	....
10 p.p.m.	dead	....	....	....
**100 p.p.m.	dead	....	....	....

* all tests were in triplicate
** milky suspension

After 68 hours most of the solution was drawn off with a fine pipette and a fresh supply of distilled water added and examined 15 hours later. The check and 0.5 p.p.m. dosages were normal, at 2.5 p.p.m. many ciliates were present but no *Paramecia*, at 5 p.p.m. two replicates showed ciliates other than *Paramecium*, at 10 p.p.m. no ciliates were present. No evidence of abnormal forms as reported by Lloyd (2) was observed.

Effect on Bacteria

The following was reported by the Department of Bacteriology from tests made on potting soil treated June 3 with 50% wettable crude.

Treatment in lbs. per 2,000,000 lbs. of soil	*% Moisture June 18*	*Bacteria and Actinomyces millions/g. June 18*	*July 7*	*July 24*	*Month later*	*CO_2 evolution in 528 hrs. as mg/100 g moist soil*	*pH Sept. 12*
nil	17.79	12.0	245.3	67	170–180	44.59	7.5
½ lb.	16.32	7.8		66			
1 lb.	16.33	9.8		76			
10 lbs.	16.31	12.1		70			
100 lbs.	17.32	12.1	20.3	62	170–180	33.95	7.6
*100 lbs. and equal amount of inositol	13.17	34.8		64			

* Treated June 18

Effect on Earthworms

Adult field collected earthworms mostly of the species *Helodulus roseus* (Savigny) were confined in lots of 50 in uncovered wooden boxes in three pounds of sifted compost (6 to 8 in. deep), stored in the dark at from 5 to 10° below outdoor temperatures, sprinkled with 25-50 ml. of distilled water every second day and fed small amounts of whole wheat flour. A fifty per cent wettable crude hexachlorocyclohexane (Hexadow—courtesy of Dow Chemicals) was incorporated into the soil at different dosage rates. The worms were sifted out and counted at intervals.

Concentration of gamma per 2,000,000 lbs. of soil	Number of worms found alive				
	After 8 days	*After 15 days*	*After 22 days*	*After 26 days*	*After 56 days*
100 lbs.	0				
100 lbs.	2				
50 lbs.	49	35	29	25	22
50 lbs.	46	27	10	0	
1 lb.	45	45	42	41	22
1 lb.	53	53	52	42	36
0	55	54	51	42	35
0	43	43	43	38	18
0	47	47	45	34	21
	7 days	*14 days*		*28 days*	*56 days*
5 lbs.	50	47		47	44
5 lbs.	47	49		49	49
3 lbs.	51	48		50	37
3 lbs.	49	50		48	34
1 lb.	51	51		50	39
1 lb.	50	49		45	25
0	51	51		50	53
0	51	50		50	53
0	50	48		48	46

No attempt was made to assay the effect on egg hatch and development of young forms.

Effect on Terrestrial Crustacea

Sowbugs (*Armadillium nasutum* B.L.) were tested as follows:

Fifteen sowbugs collected in the greenhouse were confined in each of 9 petri dishes with thin slices of potato on filter paper as follows:

Treatment	*Dead after 24 hours*	*Amount of feeding*
Filter paper dipped in a suspension of 2 g. of 50% W. BHC per 100 cc. of water, then dried	7	
	10	No faecal pellets
	8	
Potatoe slices dipped as above	1	Few pellets
	4	(all dead after 30 hours)
	2	
	0	
No treatment	0	Many pellets
	0	
Filter papers dipped in solutions (suspensions?) of 50% W. in 95% ethyl alcohol and set up as before	*Dead after 18 hours*	
0.25 g. of 50% W. in 40 ml.	9	
	11	Few faecal pellets
	11	
0.125 g. of 50% W. in 40 ml.	10	
	10	Few faecal pellets
	10	
0.625 g. of 50% W. in 40 ml.	8	
	5	Few faecal pellets
	8	
0.000 g. of 50% W. in 40 ml.	0	
	0	Many faecal pellets
	0	

As above using acetone as a solvent	*18 hours*	*42 hours*	*47 hours*	*71 hours*
0.0625 g. in 50 cc.	8	13	15	15
	9	13	15	15
	9	15	15	15
0.011 g. per 50 cc.	4	8	13	13
	1	4	4	4
	3	5	6	7
0.00625 g. per 50 cc.	1	6	8	10
	2	7	10	10
	1	2	2	5
0.0000 g. per 50 cc.	0	1	1	1
	1	1	2	2
	0	1	1	1

Effect on Some Insect Species

a. On the chicken body louse *(Eomenacanthus stramineus* (Nitz.)). In co-operation with Mr. Snyder and Mr. Telford of Canadian Industries Limited and the College Poultry Department under Professor Maw, tests were made on hexachlorocyclohexane in oil as a roost paint for control of the chicken body louse.

Six pens of from 6 to 7 hens and a cock were established with birds shown by examination to have considerable infestation. A single treatment of roost paints consisting of various concentrations of gamma isomer in oil were applied by means of a brush at 5 ml. per foot of roost.

RESULT OF BHC ROOST PAINT VS CHICKEN BODY LICE

Pen	*Percentage of gamma by weight*	*Bird*	*Approximate number of lice found in region of vent* 28 May (Prior to treatment)	29 May	31 May	3 June	8 June
8	1% in kerosene	Cock	4		0	0	0
		B-3145	35		0	0	0
		169	1		0	0	0
		A-2-288	10		0	0	0
		A-2-283	10		0	setting	0
		......	0		0	0	0
		A-2-057	100	0	0	0	0
		A-2-601	50	0	0	0	0
9	5% in oil	A-2-050	25		0	1	0
		A-2-471	5		3	0	0
		A-2-074	15		1	0	2 mites
		Cock	1		0	0	0
		A-2-045	10		0	0	0
		A-2-048	100	25	0	0	0
		A-2-212	50	0	1	0	0
10	Check	Cock	50	50	100	100	100
		A-2-221	50	100	100	100	100
		A-2-216	50		50	25	50
		A-2-081	25	10	20	50	20
		A-2-329	3		5	1	10
		A-2-248	50		50	75	100
		A-2-206	5		100	100	100
11	0.5% in oil	A-2-262	50	30	0	0	0
		A-2-220	30	30	0	0	0
		A-2-210	0		0	0	0
		A-2-227	1		dead		
		......	0		0	0	0
		Cock	1		3	0	0
		943	50	25	0	0	0
12	1% in oil	A-2-065	50	60	0	0	0
		A-2-084	100	30	0	dead	
		A-1-921	30	30	0	0	0
		A-2-107	25		0	0	0
		Cock	50		0	0	0
		A-2-276	1		0	0	0
		B-1215	0		0	0	0
13	2.5% in oil	Cock	5		0	0	0
		A-2-657	40	40	0	0	0
		A-2-606	10		0	0	0
		A-2-783	40	40	0	0	0
		A-2-211	100		0	0	0
		A-2-277	1		0	0	0
		A-2-010	1		0	0	0

Note: Lice recorded in pen 9 prior to 8 June may have been mites.

Professor Maw conducted tests on eggs from pens given the highest treatment and reported no off-flavour. At the conclusion of the tests pen 10, the check pen, was heavily treated with 5% gamma hexachlorocyclohexane in oil, and on the following day a bird from this pen and an untreated bird were killed. These birds were cooked without salt or seasoning and a taste panel of four pronounced themselves unable to detect any definite off-flavour.

It is noteworthy that northern fowl mite was present in small numbers on some birds and was not controlled.

b. On *Drosophila melanogaster*. Aqueous suspensions of 50% wettable crude hexachlorocylohexane (6% gamma) were added to the regular medium used for rearing *Drosophila melanogaster* to give a series of dosages. In each case a treated and check culture were prepared and an equal number of laying adults from healthy cultures allowed to oviposit in each medium for 12 to 24 hours. The medium was then incubated for 11 days and the adults that had emerged killed and counted. All dosages above 0.5 p.p.m. of gamma resulted in some mortality of the egg laying population during oviposition, but no dosage used killed them all off. The variation in total numbers reared at different dosages is explained by the fact that the density of the egg laying culture though always the same in the comparable treated and non-treated cultures varied at different dosage levels.

Drosophila melanogaster adults emerging from media treated with hexachlorocyclohexane

Dosage of gamma isomer	*No. of cultures*	*Flies after eleven days*	
		from treated cultures	*from checks*
.5 p.p.m.	4	894	2398
1 p.p.m.	2	0	62
1.5 p.p.m.	3	20	544
2 p.p.m.	3	24	984
2.5 p.p.m.	2	0	221
3 p.p.m.	3	0	369
3.5 p.p.m.	2	0	150
4 p.p.m.	3	5	984

c. Effect on *Aedes aegypti* larvae. Pure gamma hexachlorocyclohexane was dissolved in 95% ethyl alcohol (0.05 g. of gamma in 50 cc. ethyl alcohol) and diluted to produce the desired dosages. Distilled water in chemically clean candy jars was used and small amounts of cerograss added as larval food. Each jar contained 1 litre of water. Ten larvae, ten days old, were added to each container. Counting of the mortality at intervals of time gave evidence that a count after 18 hours was most reliable. The criterion of death was lack of any movement, when the glass jar was carefully tapped with a glass rod. Check jars to which the solvent alcohol alone was added indicated no mortality from a total concentration of 1% or less of alcohol. Three replicates were made of each test.

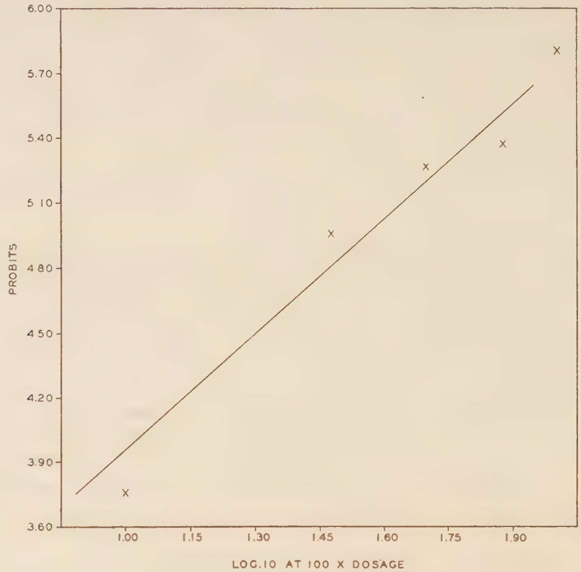

Fig. I—Mortality of Aedes aegypti larvae exposed to gamma hexachlorocyclohexane for eighteen hours. (Corrected for check mortality.)

Average percentage mortality of *Aedes aegypti* larvae 18 hours after treated with gamma hexachlorocyclohexane

Dosage	*0* p.p.m.	*.1* p.p.m.	*.3* p.p.m.	*.5* p.p.m.	*.75* p.p.m.	*1* p.p.m.
Average % mortality after 18 hours	4.7	15.0	51.0	62.3	66.3	81.3

The probit-log dosage regression line fitted to the above data by eye (Fig. I) gives the LD50 as 0.36 p.p.m. of the gamma isomer in water and the slope as 1.7.

d. On Tenebrio molitor. Lots of three or four last instar mealworm *(Tenebrio molitor)* larvae were exposed on filter paper impregnated with alcoholic solutions of 10,000 p.p.m. of gamma isomer. They all survived. Similar lots of larvae of the same species placed in flour with a few ground up crystals of pure gamma isomer and even injected with .1 ml. of an aqueous suspension 100 p.p.m. gamma failed to die. Adult beetles of the species, however, placed in lots of 12 on the paper impregnated with alcoholic solutions of 10,000 p.p.m. and in flour with ground gamma crystals were all dead or moribund in 24 hours.

Summary

Amoeba proteus lived and reproduced normally in culture water containing 5 p.p.m. of gamma hexachlorocyclohexane. 1.25 p.p.m. killed out *Paramecium caudatum* cultures in 65 hours but 2.5 p.p.m. did not kill all ciliates in one of three replicates. 100 lbs. of gamma isomer per 2,000,000 lbs. of moist soil (applied as a wettable

crude powder) reduced numbers of amoebae plated from treated soil but not those of flagellates and ciliates. Earthworms *(Helodulus roseus)* adults were killed within 8 days by 100 lbs. of gamma isomer per 2,000,000 lbs. of moist soil, were reduced in numbers in one replicate at 50 lbs., but were unaffected at 5, 3 and 1 lb. over a period of 56 days. As little as 0.00625 g. of gamma in 50 ml. of acetone used to impregnate filter paper killed a high percentage of *Armadillidium nasatum* B.L. (Isopods) exposed to it in a petri dish for seven hours.

The chicken body louse (*Eomenacanthus stramineus* (Nitz.)) was controlled by a roost paint of 1% gamma applied once at 5 ml. per foot of roost. No egg or flesh flavouring resulted with 5% gamma. Northern fowl mite was not killed.

Drosophila melanogaster failed to breed successfully when 1 p.p.m. of gamma was incorporated into the larval medium; 0.5 p.p.m. resulted in greatly reduced adult production.

The LD 50 for ten-day old *Aëdes aegypti* larvae exposed for 18 hours was 0.36 p.p.m. of gamma in water. The slope of the probit-log dosage regression line for this toxin and this test animal was 1.7.

Last instar *Tenebrio molitor* larvae were not killed by exposure to paper impregnated from concentrated alcoholic solution or to pure crystals or by the injection of 0.1 ml. of an aqueous suspension of 100 p.p.m. of the gamma isomer into the haemolymph.

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A SUMMARY OF THE MORE IMPORTANT INSECT INFESTATIONS AND OCCURRENCES IN CANADA IN 1949*

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This summary has been prepared from regional reports submitted by officers of the Division of Entomology, provincial entomologists, officers of the Division of Plant Protection, and university professors. In general, common names used are from the list approved by the American Association of Economic Entomologists. Any common names not so approved are accompanied by technical names. Only the more important insect infestations and occurrences of 1949 have been included.

GENERAL FEEDERS AND MISCELLANEA

BEET WEBWORM—In Alberta, lamb's quarters was attacked in an experimental area at Suffield and in the Bow Island district. Sugar beets were damaged in a few fields at Picture Butte but no severe infestations were reported. Infestation was general in some areas of east-central, north-central, southwestern and south-central Saskatchewan but no damage was recorded. The insect was less prevalent than in 1948 in Manitoba, infestations being confined to Portage la Prairie and the southern Red River Valley where sugar beets were attacked.

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Blister Beetles—Blister beetles were abundant in Saskatchewan for the third successive year but little damage was reported, nor was any major damage reported elsewhere in the Dominion. *Epicauta oregona* Horn, caused light damage to potatoes at Grand Forks and Cranbrook, B.C. *Lytta nuttali* Say defoliated caragana at Sutherland, Sask. and was reported at Culross, Man. *Macrobasis subglabra* Fall. damaged potatoes at Mossbank, Sask., and sweet clover at Brandon and Portage la Prairie, Man. *Lytta sphaericollis* Say defoliated honeysuckle in the Fiske, Sask., area. *Epicauta murina* (Lec.) was prevalent mainly on weeds in eastern Ontario and Quebec, but caused some damage to potatoes, beans and alfalfa. *Pomphopoea sayi* Lec. destroyed apple blossoms in some Quebec orchards. Blister beetles were very scarce in Prince Edward Island.

Cutworms—Cutworms caused slight damage to potatoes at Soda Creek, B.C. but, in general, were of minor importance in the south-central area of the Province. No damage was reported in northern Alberta, and in southern areas an expected outbreak of the pale western cutworm did not assume the proportions of a major pest, although severe infestations and crop damage occurred at Hilda, Schuler and Empress. Damage by lesser infestations from Empress eastward to Cabri was overshadowed by severe drought damage. The red-backed cutworm was troublesome in gardens, generally, and a minor outbreak occurred around Bowden, Penhold, Innisfail and Olds in brome grass seedlings and cereal crops. In Saskatchewan damage by this species was almost negligible in marked contrast to the severe outbreak in northeastern areas in 1948. Only light field infestations occurred in some districts of this region in 1949, and minor damage in a few Saskatoon gardens was reported. A further reduction from the light infestations of 1948 took place in the pale western cutworm population. *Fishia discors* Grt. was present in about the usual numbers on raspberry, delphinium and burning bush as Saskatoon. Another climbing cutworm, *Chrysoptera moneta* Fab. caused considerable damage to delphinium in the Saskatoon area. The bertha armyworm was present on rape in numbers greatly reduced from the high of 1948. This species was present also in Manitoba where it injured flax at Nesbitt, and caused much damage by boring into the heads of cabbage at Brandon. Red-backed and dark-sided cutworms, while less abundant than usual at Brandon and Portage la Prairie, caused moderate damage to seedling onions. The armyworm occurred in minor infestations at Selkirk and St. George.

In Eastern Canada the armyworm occurred in outbreak form in several areas for the first time in many years. In Ontario outbreaks were sporadic but caused moderate to severe damage to spring grains, garden crops and corn throughout the agricultural areas of the Province generally. Field crops were extensively damaged in the East Florenceville area of New Brunswick, and in Kings and Lunenburg counties in Nova Scotia. Other species of cutworms were generally prevalent. On tobacco, in Ontario, the darksided cutworm was more injurious than in 1948, the variegated cutworm occurred in about normal numbers, and the black cutworm was much less numerous than in 1948. At Chatham, the yellow-striped armyworm was found feeding on tobacco, constituting a first record on this crop in the Dominion. Species of *Agrotis* and *Euxoa* were reported to be decreasing in Quebec, while the black army cutworm was generally prevalent, particularly in the counties of Abitibi and Lake St. John. Garden transplants were considerably damaged by the variegated cutworm throughout Nova Scotia and by unidentified species in Newfoundland. In Prince Edward Island the black and variegated cutworms were present in very large numbers in the eastern part of the Province and caused serious damage to grain. The fall armyworm was also abundant and seriously damaged sweet corn.

European Earwig—This insect was reported for the first time in Manitoba where it was found at Winnipeg in fruit shipped in from British Columbia. The infestation at St. John's, Nfld., first reported in 1947, has spread over a large area.

GRASSHOPPERS—A severe outbreak of *Melanoplus mexicanus mexicanus* (Sauss.) occurred in a small area of south-eastern British Columbia near Roosville and Newgate. *Camnula pellucida* (Scudd.) was present in light to moderate numbers there and farther north in the St. Mary's Prairie district. Increases occurred in the Creston and Lac du Bois areas but did not reach economic importance. An interesting outbreak of *Melanoplus bivittatus* (Say), rather intensive but very local, was found in the Indian Reserve at Koksilah. Adults were abnormally small and dark in colour. Elsewhere in the Province populations were below normal.

The grasshopper outbreak in Alberta was the most severe since 1938. Throughout the greater part of the area west of a line running from Lethbridge to Vulcan the major species was *Melanoplus mexicanus mexicanus* (Sauss.). The major species along the western limit of the outbreak was *Melanoplus bivittatus* (Say). A mixture of three *Melanoplus* species, *mexicanus, bivittatus*, and *packardii*, occurred in an area around Drumheller, Three Hills and Rockyford. *Camnula pellucida* (Scudd.) was the main species in the Castor-Coronation-Consort-Provost-Boda district, with a few light to moderate infestations in the heavier soils around Acadia Valley.

Grasshoppers were present in outbreak numbers in Saskatchewan over an area of 198 rural municipalities, as compared with 170 municipalities in 1948. The infested area included over two-thirds of the agricultural area of the Province. In spite of the intensive provincial control campaign many millions of dollars worth of crop were completely destroyed or required re-seeding after early spring damage, and garden crops suffered the greatest damage in several years.

Involved in the outbreak were *Camnula pellucida* (Scudd.), *Melanoplus mexicanus mexicanus* (Sauss.), *Melanoplus bivittatus* (Say) and *Melanoplus packardii* (Scudd.). Throughout central Saskatchewan, *C. pellucida* hatched in phenomenally large numbers very early in relation to crop development, and hatching continued over an extended period of time. *M. mexicanus* was later in hatching but damage was evident throughout the drought stricken areas of southwestern, south-central and central Saskatchewan. In southeastern Saskatchewan, where *M. mexicanus* and *M. bivittatus* made up the larger proportion of the population, spring damage was not extensive. In areas where severe infestations of these two species were expected, damage was not evident until July and August. Grasshoppers were relatively unimportant in the extreme southwestern part of the Province where extreme drought and excessive heat resulted in a complete crop failure. *Psoloessa delicatula delicatula* (Scudd.), *Aeropedellus clavatus* (Thomas), *Pardalophora apiculata* (Scudd.) and *Xanthippus corallipes latefasciatus* (Scudd.) were more numerous than for some years and caused the usual reports of hatching during April and early May. Populations of *Aerochoreutes carlinianus carlinianus* (Thom.) showed some increase in number. *Melanoplus dawsoni* (Scudd.) and *Melanoplus femur-rubrum* (Deg.) were of no economic importance. *M. infantilis* (Scudd.) was more numerous than for several years in the Saskatoon area. Parasites and predators of grasshoppers were present in normal numbers in 1949, but gulls appeared in July in phenomenally large flocks and fed upon grasshoppers in the Simpson-Liberty area. Surveys indicate that the outbreak in 1950 will include practically the same area as in 1949 with some extension to the south and east.

In Manitoba, *Melanoplus mexicanus mexicanus* (Sauss.), *Melanoplus bivittatus* (Say) and *Camnula pellucida* (Scudd.) were the chief species present. They hatched in outbreak numbers from Neepawa southeast through McGregor and Elm Creek to Carman. In the southwest and in the Red River Valley hatching was delayed. Little actual loss occurred in Manitoba in 1949, due mainly to insecticide control measures and favourable growing conditions, although the area infested in the fall was roughly twice that of 1948 and the degree of severity had increased.

An outbreak of *Melanoplus femur-rubrum* (Deg.), as severe as that of 1948, occurred in eastern Ontario and extended into Quebec. Garden crops, field tomatoes, alfalfa and pasture were considerably damaged in many areas. In Hastings and adjoining counties this species was fairly common but was dominated by *C. pellucida* which was very common. *Encoptolophus sordidus* Burm. was very common in late summer. The grasshopper predator *Mantis religiosa* L. reached a new high in abundance in this area. In southwestern Ontario *M. femur-rubrum* and *Dissosteira carolina* (L.) were less numerous than in 1948 but caused moderate damage to ripening peaches and considerable damage to raspberries.

Grasshoppers were even more abundant than in 1948 throughout Quebec, particularly in the St. Maurice Valley and in southwestern Quebec where *M. femur-rubrum* was very abundant throughout the season, causing severe damage to vegetables, oats, windfall apples and other crops. *C. pellucida* and *M. bivittatus* were present in lesser abundance.

No serious grasshopper infestations were reported in the Maritime area.

Japanese Beetle—Trapping in southern regions of Eastern Canada resulted in the capture of 178 beetles as compared with 169 in 1948. Captures were made as follows: Halifax 25, New Toronto-Mimico 4, Hamilton 31, Stoney Creek 5, Niagara Falls 11, Fort Erie 65, Port Burwell 8, St. Thomas 3, Windsor 26.

June Beetles—*Polyphylla perversa* Csy. continued to cause serious damage to small fruits on Vancouver Island and the coastal mainland of British Columbia. In fact many growers have discontinued the growing of susceptible crops. Damage in the Kamloops area was less apparent than in 1948. However, large flights of *Phyllophaga anxia* (Lec.) were observed in May.

No major damage was reported in the Prairies Provinces although some localized injury occurred. *Phyllophaga* sp. caused some damage to strawberries and potatoes at Medicine Hat, Manyberries, Lethbridge and Drumheller in Alberta. *P. anxia* (Lec.) occurred in potato fields at Cookson, Meunster, Robinhood and Henribourg, and on strawberries at Battleford in Saskatchewan. In Manitoba prairie grass was killed in some areas at Aweme by larvae of *Phyllophaga* spp.

In Eastern Canada, major flights of *Phyllophaga* spp. occurred in most of the area bordering the western half of Lake Ontario and in Lambton County, Ont., where host trees were severely defoliated. Severe crop and pasture damage is forecast for this area in 1950. Elsewhere in the agricultural areas of the Province mature white grubs are present in record numbers and will emerge in 1950. Moderate to severe white grub damage occurred in Quebec in the vicinity of Quebec City and in the Eastern Counties. In New Brunswick some injury to small fruit plantations was reported and in Prince Edward Island slight injury occurred on potato tubers and strawberry plants.

Mantids—The Chinese mantis, which has not previously been recorded in Canada, was reported as occurring at Montreal, Drummondville, and Frampton, Dorchester County, in the Province of Quebec. The European mantis was much more numerous and widespread than in 1948 in Ontario, and has spread throughout most of southwestern Quebec.

Painted Lady—Adults and larvae appeared in unusually large numbers in Saskatchewan, Manitoba and Eastern Canada in 1949. They were very abundant in northern areas from Newfoundland to Churchill, north to Chesterfield Inlet, N.W.T., and Point Harrison, Que. At Great Whale River, Que., larvae occurred in tremendous numbers. Canada thistle, yarrow and tansy were preferred hosts, but some damage was done to hollyhock and sunflower in Saskatchewan and Manitoba, while false ragweed and plantain were also attacked. This species does not overwinter north of the most southerly areas of Ontario in Canada.

ROSE CHAFER—Small fruits and ornamentals were severely attacked in Simcoe County, Ont.

TARNISHED PLANT BUG—In British Columbia, "cat-facing" of peaches compared with 1948, and in Manitoba damage to garden crops was below average. No appreciable damage was reported in Ontario and Quebec, but in New Brunswick cucumbers were extensively damaged, in Nova Scotia garden crops and apple buds were attacked and in Prince Edward Island slight damage was done in potato fields and flower gardens.

WINTER MOTH—An infestation of *Operophtera brumata* (L.) at Halifax and from Chester to Liverpool, along the south shore of Nova Scotia, constitutes the first record of this insect in North America. It was found on a wide variety of hosts including apple, choke cherry, hawthorn, linden, oak, elm, white ash, hophornbeam, red maple, white birch and yellow birch. Complete loss of foliage occurred in many apple orchards. It is believed that the infestation has been present for several years, having been mistaken for cankerworm which it closely resembles.

WIREWORMS—Damage, as usual, was general throughout British Columbia. *Agriotes lineatus* (L.) and *A. obscurus* (L.), two of the most dangerous wireworms of Europe, were discovered in a field of potatoes near Cobble Hill on Vancouver Island where they caused at least sixty per cent loss. The infested farm, although one of the first to be developed in this area, is still completely surrounded by forest. *Agriotes* larvae in the lower Fraser Valley, previously suspected of being an introduced species, have proved to be the native species *A. sparsus* Lec., of which the larva was not previously known. Further infestations of *A. sparsus* were discovered in 1949 south of Cloverdale and in several fields on Lulu Island where severe damage was done to potatoes. In northern Alberta damage was at a minimum with the exception of the Peace River District where *Ctenicera aeripennis destructor* (Brown), and to a lesser extent *Hypolithus nocturnus* Esch., caused severe to very severe damage to cereal crops generally. Wheat on summerfallow was most severely damaged. In central Alberta the former species was chiefly responsible for about 25 per cent thinning on spring wheat dry land in the Claresholm-Champion-Vulcan area, and light to moderate thinning between Calgary and Wetaskiwin. Damage was severe in the Camrose area and moderate in the Edmonton-Chauvin area. Spring wheat on irrigated land at Coaldale was thinned 25 to 30 per cent. Winter wheat in the Magrath area was severely injured, chiefly by *H. nocturnus*. Drought, frost and root-rot confused the damage picture in central Alberta.

In Saskatchewan, widespread damage was done, chiefly by *C. aeripennis destructor* to cereal crops, potatoes and other vegetables. Most severe damage occurred in wheat seeded in summerfallow, and thinning was most prevalent on medium-textured soils in the central and western parts of the agricultural area. Damage in study blocks at Saskatoon and Scott was somewhat less than in 1948 but at Swift Current it was 11 per cent as compared with 6 per cent in 1948. Severe damage occurred in the Delisle-Allan area and at scattered points in southern Saskatchewan. From White Fox to Glaslyn in northern Saskatchewan damage was light to moderate. At Weyburn in the southeastern area of the Province damage was lighter than in 1948.

In Manitoba injury by *C. aeripennis destructor* was generally below average in the Elgin-Fairfax and Virden-Woodnorth districts where damage regularly occurs. Some damage, probably by another species, occurred at Headingly and Dugald.

In Eastern Canada wireworms appear to have been somewhat more prevalent than usual. Tobacco transplants, potatoes and various root crops were severely damaged in southwestern Ontario. Corn, fall wheat and tomato transplants were also attacked. In Quebec, damage to wheat by the wheat wireworm was comparable

to that experienced in 1948. Reports of damage to field crops in Nova Scotia were more numerous than usual, and in Newfoundland potatoes and other crops were extensively attacked in the Avalon Peninsula area. Minor damage was done to potato tubers in some areas of Prince Edward Island.

CEREAL, FORAGE CROP AND TOBACCO INSECTS

ALFALFA CATERPILLARS—*Diacrisia* spp., abundant in many areas of northern Saskatchewan in 1947 and 1948, were difficult to find in 1949. *Colias* spp. were less abundant in Manitoba than in 1948 when 5 per cent damage was done to alfalfa foliage.

APHIDS—The English grain aphid appeared in epidemic numbers on Vancouver Island and in the Lower Fraser Valley, B.C., causing considerable reduction in oat yields, but in Alberta there was no recurrence of this insect which caused severe damage to cover crops in 1948. The greenbug, *Toxoptera graminum* (Rond.) invaded southwestern Manitoba and southeastern Saskatchewan for the second year in succession. This was apparently a northward extension of a severe infestation which occurred in the Dakotas and in Minnesota in the United States. The outbreak in southwestern Manitoba, and including some areas to the east, was the worst in the history of the Province and destroyed some 100,000 acres of late-sown oats and barley. The outbreak in southeastern Saskatchewan was comparable in extent and severity to the outbreak which occurred in 1930. It affected an area along the Manitoba border approximately 12 to 18 miles wide and 100 miles long, and either destroyed or severely damaged practically all coarse grains sown after June 1. An unusually severe infestation of aphids occurred on alfalfa in the northern Cariboo in British Columbia where potatoes also were moderately infested. The corn leaf aphid was much less prevalent than in 1948 in southwestern Ontario but was generally prevalent in New Brunswick.

BEES—Native bees were few in number as compared with 1948 in northern Saskatchewan and a poor crop of alfalfa seed resulted.

CHINCH BUGS—A severe local infestation of *Blissus occiduus* Barber occurred in a brome grass pasture at Brunkild, Man., and also caused some damage to wheat. *Blissus leucopterus* (Say) was of minor importance in Eastern Canada.

CLOVER WEEVILS—The pea leaf weevil continued to spread northward on Vancouver Island and at Millbank, B.C., caused severe damage to clover. The sweetclover weevil, which was first recorded in Alberta in 1941, has spread over the entire Province. It was very abundant in both Alberta and Saskatchewan in 1949 and caused serious damage to sweet clover generally. Loss of seed was estimated at 15 to 40 per cent in Saskatchewan. In Manitoba and Ontario damage was reported to be moderate. *Sitona tibialis* Hbst. was abundant in many alfalfa fields in Saskatchewan but caused little damage. *Tychius picirostris* (Fab.), not previously reported in the Prairie Provinces, was found damaging the seed of white Dutch clover at Saskatoon, and alsike and white Dutch clovers at Yorkton, in Saskatchewan. It was also taken on white clover at Brandon, Man. In southwestern Ontario it caused serious damage to the seed of alsike clover, some fields yielding only from one-third to one bushel per acre. *Tychius stephensi* Schoen (*T. griseus* Schaef.) was also general in this area causing significant seed damage to red clover. Heavy infestations of *Tychius* spp. were general throughout Ontario.

CORN EARWORM—This insect, reported from all provinces but Alberta, was more prevalent and widespread than usual in Western Canada, and in Ontario where infestation ranged as high as 80 per cent of the ears in some southwestern areas. Infestations were light in Quebec and the lightest in several years in the entire Maritime area.

DIAMONDBACK MOTH—Infestation of rape was greatly reduced from the unusual high of 1948 in Saskatchewan.

FLEA BEETLES—*Chaetocnema* sp. near *ectypa* did considerable damage to both sweet and silage corn at Armstrong, B.C. *Phyllotreta* spp. severely damaged Argentine rape in the Dunrea district in Manitoba.

EUROPEAN CORN BORER—This insect was recorded for the first time in both Saskatchewan and Manitoba. Six very small infestations were found in southeastern Saskatchewan close to the International Border, and in Manitoba specimens were taken at Brandon, Morden, Winkler and along the Red River northward to St. Norbert. Considerable damage was done to sweet corn south of Winnipeg. Populations were maintained throughout Ontario. Damage to corn was generally spotty but severe along Lake Erie where sweet peppers also were severely damaged and gladiolus and oats were lightly infested. In Quebec populations remained at a low level and in New Brunswick were generally distributed in somewhat reduced intensity. Some increase was indicated in Nova Scotia, and in Prince Edward Island two specimens taken near Summerside constituted the first record for the Province.

HESSIAN FLY—A small infestation was noted at Agassiz, B.C. and damage was reported from several points in northeastern Saskatchewan.

PLANT BUGS—*Lygus* spp. generally prevalent on alfalfa at Kamloops, B.C., but in Saskatchewan they were at the lowest ebb in several years. *Plagiognathus obscurus* Uhl. was locally abundant on alfalfa at Vernon, B.C., and in Saskatchewan was observed only in small scattered infestations. *Adelphocoris rapidus* (Say) occurred in small numbers on alfalfa in Saskatchewan and Manitoba, and *Adelphocoris lineolatus* (Goeze) was reported in light infestations in Manitoba.

RED TURNIP BEETLE—Populations on rape in Saskatchewan were greatly reduced as compared with the severe infestation of 1948.

SAY STINK BUG—This species was more abundant and widespread in Alberta than at any time since 1943. Concentrations were observed at Turin, Bow Island and Bindloss. In Saskatchewan it was observed in small numbers in nearly all grain fields in the Kindersley district, and at Fox Valley and Pennant.

THRIPS—In British Columbia *Frankliniella moultoni* Hood was numerous on alfalfa at Kelowna, and *Haplothrips niger* Osb. was present in moderate numbers on red clover near Creston. *Haplothrips leucanthemi* Sch. caused concern among alsike and red clover seed growers in northern Alberta, and *Anaphothrips striatus* Osborn was prevalent on grain, particularly barley. At least two species of thrips were observed in sub-economic numbers on alfalfa in Saskatchewan, and in Manitoba sweet clover bloom was severely damaged at Dauphin while barley was damaged at Carman and Teulon.

TOBACCO INSECTS—The green peach aphid for the second consecutive year caused great concern to tobacco growers in southern areas of Essex, Kent, Elgin and Norfolk counties, Ont., and it was reported to be spreading northward. Tomato hornworm was more abundant throughout Ontario than in 1948. In southwestern areas of the Province the dark-sided cutworm was more injurious to young tobacco plants than in 1948, while the variegated cutworm was present in about normal numbers and did not cause serious damage. The black cutworm was much less numerous than in 1948 when it occurred in outbreak form, and for the first time on record in Canada the yellow-striped armyworm, *Prodenia ornithogalli* Guen. was found feeding on tobacco, the record being made at Chatham. An outbreak of the tobacco budworm occurred near Cedar Springs, Ont., a stink bug, *Euschistus variolarius* (Beauv.), caused some feeding injury in Norfolk County, Ont., and specimens of the corn

earworm were collected from tobacco shoots near Cedar Springs, Ont., in early October. Many other insects were minor pests.

WHEAT STEM SAWFLY—In south-central and southeastern Alberta, the area most severely infested, damage has been greatly reduced by growing sawfly-resistant wheat but some severe infestations were still prevalent. In the infested areas of Saskatchewan, too, crop loss was appreciably less than in 1948. The European wheat stem sawfly was present in Ontario at Chatham, Blenheim and Tillsonburg but no severe damage was reported.

VEGETABLE INSECTS

APHIDS—The cabbage aphid was a major garden pest, particularly on late cabbage, in Ontario and in parts of Nova Scotia. The pea aphid occurred in greatly reduced numbers on peas and alfalfa in British Columbia and southern Alberta, but in Ontario many complete pea crop failures were reported, notably in the Grand Valley area. A severe infestation occurred also at St. Jean, Que. Severe damage was done in Nova Scotia where the infestation approximated that of 1948. Potato aphids were reported to be comparatively scarce on potatoes in Manitoba, Ontario and Newfoundland, but early tomatoes were severely attacked in southwestern Ontario. Populations were about average in New Brunswick and Nova Scotia but in Prince Edward Island *Macrosiphum solanifolii* (Ashm.) caused some serious damage. A severe outbreak of the sugar-beet root aphid through the sugar-beet area of Alberta materially reduced the tonnage and sugar content of the crop, the latter being the lowest in ten years. The most severe damage resulting from an early frost occurred in those fields which had been most severely damaged by the aphid. This species also occurred at Carman, Man. The turnip aphid was abundant late in the season on Vancouver Island and was so abundant in Ontario that the turnip crop was almost a total failure. Severe damage was reported also in Nova Scotia. *Cavariella pastinacae* L. occurred in epidemic numbers in the Lower Fraser Valley, B.C., where celery, parsnips and carrots were seriously injured, and at Grand Forks where the carrot seed crop was severely attacked. *Aphis rumicis* L., was common on Vancouver Island.

CABBAGE LOOPER—Infestation at Brandon, Man. was double that of 1948 and damage equalled that of *Pieris rapae* (L.). The looper was common also at Winnipeg, Man. and in the Maugerville-Sheffield area of New Brunswick.

CARROT RUST FLY—Damage on Vancouver Island, B.C., was greater than in 1948. A reduced infestation was reported in the eastern part of the Lower Fraser Valley, but in the Delta area damage was widespread and severe. Light infestations occurred at Salmon Arm and considerable injury resulted at Nelson where the insect was reported for the first time. In Ontario and Quebec damage was irregular and while serious in the Bradford, Ont. area, was generally lighter than in 1948. Infestations were reported in Nova Scotia, and in Prince Edward Island and Newfoundland the carrot crop was seriously damaged, injury ranging up to 80 per cent at St. John's, Nfld.

COLORADO POTATO BEETLE—Little damage was done in British Columbia where the beetle seemed to be scarcer than in 1948. Infestations were general in southern Alberta but losses were light. A general increase was reported in Saskatchewan, the beetle being more abundant than for several years in central areas, but damage was negligible. Severe and widespread injury occurred in Manitoba where controls were not applied. In Eastern Canada infestation while general was comparatively light, apparently due in part to effective control measures in recent years.

CUCUMBER BEETLES—Both striped and spotted cucumber beetles were reported in Ontario, the former being more numerous and injurious than usual in eastern areas of the Province.

False Chinch Bug—Adults of this species attacked potatoes in the southern Okanagan Valley and radishes at Grand Forks in British Columbia. Large populations were present also on the carrot seed crop in the latter area and smaller populations occurred on sunflower and lettuce seed crops. Early in August they could be taken in numbers from all herbaceous vegetation, especially pastures in the Cariboo. No nymphs were observed on the vegetable or seed crops.

Flea Beetles—In Saskatchewan the potato flea beetle attacked potatoes at Whitewood but was not reported from Estevan where a severe infestation occurred in 1947. In Manitoba it was common at Brandon and Winnipeg but was not observed at Sifton, Dauphin, Boissevain, Melita and Hargrave. The species was generally more abundant than usual on potato and tomato throughout Eastern Canada, with the possible exception of Newfoundland where damage was reported to be slight. The tuber flea beetle caused a great deal of damage to potatoes in British Columbia throughout the Okanagan Valley, from Salmon Arm westward to Kamloops, Merritt, Ashcroft and Spence's Bridge, and in the Lower Fraser Valley where it was somewhat less abundant than in previous years. New distribution records were obtained from Pemberton, a northward extension of about 100 miles from Vancouver, and from Quesnel, Clearwater and Rock Creek. Commercial damage occurred generally on potatoes for the first time in the Saanich Peninsula. *Phyllotreta* spp. were common on Vancouver Island, damaged turnip seed at Armstrong, B.C., turnips at Quesnel, B.C., turnips, horseradish and radish at Saskatoon, Sask., and cabbage seedlings at Regina and Bridgeford, Sask. In Manitoba damage was severe at Carman but generally below that of 1948 elsewhere in the Province. Infestations were general on Cruciferae throughout Eastern Canada but damage was moderate.

Imported Cabbageworm—Little damage was reported in British Columbia but the insect was abundant in southern areas of the Prairie Provinces, particularly in Manitoba where severe damage occurred. Infestation was generally moderate in Eastern Canada although damage was reported as being severe in the Sussex, N.B. area and throughout Prince Edward Island where turnips as well as cabbage were infested.

Leafhoppers—The potato leafhopper was abundant on potatoes at Winnipeg but scarce elsewhere in Manitoba. Beans were lightly infested in southwestern Ontario, and in eastern Ontario hopperburn was common on potatoes in early summer. Infestation was lighter than usual in Quebec and Prince Edward Island and about normal elsewhere in the maritime area. The six-spotted leafhopper severely infested beans at Ogema, Sask., and in Manitoba about 25 per cent of the carrot plants at Brandon developed aster yellows, while at Winkler potatoes showed purple top and much hopperburn. The insect was prevalent also in Nova Scotia.

Mexican Bean Beetle—This recently introduced species has appeared again in the Niagara Peninsula after an apparent disappearance in 1948. The infestations in the Chateauguay-Huntingdon area of Quebec continued to decrease but several specimens were found at Rougemont, Que., and it was reported again from St. Stephen, N.B.

Mites—The two-spotted spider mite severely infested vegetable and seed crops at Grank Forks, B.C., where it was present on almost all vegetation. Squash stored in a heated warehouse at Cambridge, N.S., also became severely infested.

Onion Maggot—Damage to onions was severe in 1949, and general from the southern interior of British Columbia eastward to Prince Edward Island. As a result of early oviposition in Ontario and Quebec, seeded onions escaped the main attack but transplants and Dutch sets were severly infested.

Onion Thrips—Moderate infestations were reported from Kelowna, Kamloops and Grand Forks in British Columbia and from southwestern Ontario, while in the Montreal district, Que., it was reported as being abundant.

PEA MOTH—Peas in the Lower Fraser Valley, B.C. were again almost free of attack. Infestations in Nova Scotia were below 5 per cent where found, but in Prince Edward Island infestation was general ranging up to 90 per cent around Charlottetown.

ROOT MAGGOTS AFFECTING CRUCIFERAE—*Hylemya brassicae* (Bouché) was an important pest on early cabbage and cauliflower and on turnips on Vancouver Island, B.C. *Hylemya* spp. were abundant and widespread in the Lower Fraser Valley but were not a serious pest in the interior of the Province. The unusual occurrence of one or more species as foliage miners in brussels sprouts was noted at Chilliwack and Agassiz, much damage being done in one area. *H. brassicae* caused severe damage to radish at Brandon, Man., and injury to cabbage and cauliflower was the most severe in several years in eastern Ontario and in the Maritime area. Many growers in the Maugerville-Sheffield area of New Brunswick lost their entire cauliflower crop. Turnips also were seriously damaged in the Maritimes. *Hylemya crucifera* Huck., was present in moderate numbers on cabbage, cauliflower and turnips at Saskatoon, Sask., and at Dauphin and Brandon in Manitoba. The turnip crop was a complete loss at Dauphin. *Hylemya floralis* (Fall.) was reported from Oakburn and Pine Ridge, Man., in light to moderate infestations in New Brunswick and more numerous than usual on turnips in Prince Edward Island. Larvae of *Hylemya planipalpis* Stein, recovered from radish in Saskatoon, constituted the first record of the species in Saskatchewan.

SEED CORN MAGGOT—This species was prevalent on Vancouver Island, B.C., and at Brandon, Man., where potatoes and onions were attacked, blackleg disease of potatoes being associated with the attacks. Infestation was general but light in Ontario and Quebec, while in Prince Edward Island serious damage was done to cucumber plants in some areas.

SQUASH BORER—This borer continued to spread and destroy pumpkin and squash vines in southwestern Ontario northward to Huron County.

TOMATO HORNWORM—Infestations on tomatoes and tobacco were general in Ontario, and in eastern areas were probably the most severe on record. The insect was common also in Quebec, notably in the Richelieu Valley, and was reported from several localities in New Brunswick.

FOREST AND SHADE TREE INSECTS*

In the Maritime Region several hundred species of forest insects both harmful and beneficial, were identified. The European pest known as the winter moth was discovered for the first time in North America attacking apple, elm, oak and other trees in Nova Scotia. The elm leaf beetle was also found for the first time in the east defoliating elm. Outbreaks of the spruce budworm appeared in northern New Brunswick and evidence of mass flights of this destructive species was obtained. A special survey of Newfoundland disclosed the fact that the balsam woolly aphid became established there some years ago, probably as a result of spread from the Canadian mainland. The most destructive insect on the island at the present time is the hemlock looper.

The outstanding features concerning forest insect infestations in Northern Ontario include a decline in spruce budworm infestations in most of the areas where severe epidemics have been in progress; continuation of the larch sawfly infestations in northwestern Ontario and extensive build-up of populations of the forest tent caterpillar in widely scattered parts of the Province.

In the Park Belt of the Prairie Provinces the fall cankerworm occurred chiefly in southwestern and central Saskatchewan, the yellow-headed spruce sawfly in the

*This summary has been abstracted from a Divisional Report prepared by the Forest Insect Investigations Unit, Division of Entomology, Science Service, Ottawa.

parkland areas of Manitoba and Saskatchewan, and pine needle scale was generally distributed.

An intensive survey of the Interior region of British Columbia made in the spring showed that heavy infestations of the Douglas fir tussock moth of 1948 in the Kamloops Forest District had completely subsided. Although several new infestations were located these also collapsed towards the end of the season. Disease was the primary cause of the decline of the infestations, but parasites were also important control factors.

Infestations of the mountain pine beetle are active in lodgepole pine in several areas in the East Kootenay district. Outbreaks of this species of bark beetle have also occurred in western white pine in the Revelstoke and Shuswap districts.

An outbreak of the Engelmann spruce beetle found in 1949 in spruce at Bolean Lake constitutes a serious threat to the selectively logged areas and to the adjoining extensive uncut stands. At present, the infestation is confined almost entirely to an isolated uncut stand and to the logged area immediately surrounding it. More than 80 per cent of the spruce 12 in. D.B.H. and over, in the centre of the infested area have already been attacked.

The satin moth was found this year to have extended its range eastward from Lytton into the Interior dry-belt. Heavy defoliation of Lombardy poplars occurred near Ashcroft, at Savona and also at Stump Lake.

Only light to medium infestation of the larch sawfly occurred in 1949, with the parasites *Mesoleius* and *Tritneptis* continuing to be important control factors.

The spruce budworm outbreak which has been in progress during the past 15 years, is still the most urgent forest insect problem in Canada, especially in the areas east of the Great Lakes.

The history of the Green River Watershed area has been reconstructed from a study of the present stand and it shows that a severe outbreak of the spruce budworm took place between 1913 and 1918. Damage was related to the age and vigour of the stand and severe mortality resulted in stands over 60 years of age, while those under 45 years suffered only a loss of increment. An outbreak of the black-headed budworm which developed in 1947 and 1948 was brought to an end in 1949 largely by and increase in larval parasites. The spruce budworm has, however, increased.

Studies of life histories and descriptions of immature stages have been completed for a number of budworms associated with the spruce budworm, a gall aphid causing injury to white pine, and two midges forming galls on balsam and spruce.

The most notable feature of forest insect conditions in Northern Ontario was the rather general decline in spruce budworm populations in fairly extensive regions where severe infestations had been experienced in recent years. This was particularly evident in the area surrounding Lake Nipigon and in the area around White Lake and the western portion of the Kapuskasing District. However, fairly active infestations persist in the area adjacent to Lac Seul in the Sioux Lookout district and in the eastern portion of the province comprising sections of the Kapuskasing, Cochrane and Gogama districts. New infestations have built up in comparatively small areas in the southeastern portion of the Algonquin District and on the Sibley Peninsula and Black Bay Peninsula east of Port Arthur.

The spruce budworm was detected over most of Manitoba but nowhere, except in the Spruce Woods Forest Reserve, is it present in infestation proportions. In the Reserve, studies show that from 89 to 97 per cent of the budworms are killed annually from the time the larvae become established in the buds in the spring to the end of

pupation. Most of this mortality is apparently caused by the parasites, predators and disease. Indications are that the spruce budworm is slowly declining in the study areas, whereas another defoliator, the spruce needleworm, which also preys on the spruce budworm, is increasing.

The spruce budworm population in Banff and Kootenay National Parks, B.C., increased alarmingly in 1949 and extensive infestations continue to be active in various stands of spruce and alpine fir in the southern half of the Province.

Studies of the European spruce sawfly, which caused widespread injury to spruce in Eastern Canada some 10 years ago, have shown that it is under control as a result of the introduction of parasites and a virus disease.

The larch sawfly continued in moderate to severe infestation throughout northwestern Ontario. Parasitism of the cocooned larvae has remained at fairly low levels during recent years. Most of the successful parasites are Diptera; the Hymenopteron *Mesoleius aulicus* (Grav.) emerging only occasionally.

In western, central, eastern and southern Manitoba the severe larch sawfly outbreak of recent years showed signs of abating. The decline is attributed to depleted food supply and an increase in parasites and predators. North and west of this region lies a zone of current maximal abundance including, in Manitoba, the territory from Mafeking to Sherridon and in Saskatchewan, the Pasquia, Porcupine, Ft. a la Corne, Nisbet and the eastern part of the Big River Provincial Forests. West of this zone to Alberta, the sawfly is widely, but lightly, distributed.

At the present time, the lodgepole needle miner, *Recurvaria milleri* Busck, is the most destructive forest pest in the Rocky Mountain region. The outbreak covers 450 square miles in Banff, Kootenay, and Yoho National Parks. The miner is also making its appearance in considerable numbers in Jasper National Park and in several places on the eastern slope of the Rockies. For the first time in the history of the present outbreak, control by native parasites shows some promise; it varies from 50 to 75 per cent in the older parts of the outbreak. The needle miner population decreases with increasing elevation and is heaviest in the upper part of the tree crowns. Estimates of entire populations ranged from less than 10,000 larvae in a 13-foot tree to 196,000 in one of the taller trees.

In British Columbia, studies of the deterioration of timber defoliated by the hemlock looper in 1946 were continued during the past year. It is evident that, in 1949, the secondary insect population reached its peak, producing the highest rate of mortality among marginal trees since 1946. This applies to all species, although western hemlock was affected to the greatest extent, with Douglas fir, balsam fir and Sitka spruce following in the order named. Most of the mortality has occurred among trees that had lost 95 per cent or more of their foliage, but some death has occurred among those that suffered only 50 per cent defoliation.

It has been shown that the bronze birch borer is not responsible for the initiation of the "dieback" of birch and multiplies only in trees weakened by other causes.

The infestation of subterranean termites in the City of Toronto continues to be severe. As a result of special surveys which were concluded in 1949, it is now known that this pest is restricted to seven or eight distinct areas in southeastern Toronto and the neighbouring part of Scarborough Township. Termites are well established and total eradication is an impossibility. Surveys to determine the distribution of termites were also carried out in the southern counties of Ontario from the Niagara Peninsula to Lake Huron. No specimens were found anywhere in the Province except in the Toronto area.

Deterioration of fire-killed white, red and jack pine trees, which died in May and June, 1948, in the Mississagi area of Ontario, by wood-boring beetles and by sap-staining fungi reached its maximum during the 1949 season and caused value losses ranging from about 22 per cent to 57 per cent in white pine, dependent on original quality of the timber; from 8 per cent to 18 per cent in red pine in different stands, and about 5 per cent in poor quality overmature jack pine..

In the parkland districts of Saskatchewan, injury by the yellow-headed spruce sawfly to spruce in farm shelter-belts was prevented by spraying. Parasitism of this insect was found to be more important in farm shelter-belts than formerly supposed. It ranged from 30 to 40 per cent.

Excellent control of 4 species of blister beetles destructive to caragana field shelter-belts also was obtained by spraying.

FRUIT INSECTS

APHIDS—Apple aphids were generally reported in nearly all fruit-growing areas of the Dominion. The rosy apple aphid was much more abundant than in 1948 in Essex and Kent counties in Ontario, 25 per cent injury in some varieties being reported. The first important infestation in many years occurred at St. Jean, Que. In the Annapolis Valley, N.S., the species was generally numerous causing considerable loss in a few orchards, and *Aphis pomi* Deg. was reported in moderate but not serious infestations in all apple-growing areas of the Province. *Eriosoma lanigerum* (Hausm.) was one of the most troublesome pests of apple in British Columbia; a general increase was reported in Essex County, Ont., and light infestations occurred in Nova Scotia where the apple-grain aphid also was reported in moderate numbers.

THE BLACK CHERRY APHID was less injurious than in 1948 in British Columbia and no serious infestations were reported in Ontario.

THE CURRANT APHID was very abundant in the Brandon, Man., area, but occurred in reduced numbers in the Niagara, Ont., district and was reported to be very scarce in Prince Edward Island. *Amphorophora cosmopolitana* Mason occurred on black currant at Brandon, Man.

The peach crop in British Columbia was not injured by the BLACK PEACH APHID as in 1948, nor was the GREEN PEACH APHID of much importance.

THE MEALY PLUM APHID was less abundant than in recent years in British Columbia and of little importance in southwestern Ontario.

THE STRAWBERRY APHID, the main vector of the strawberry yellow virus, caused some damage at Vancouver, B.C.

APPLE AND THORN SKELETONIZER—A serious outbreak on apples on Vancouver Island was followed by unusually large flights of adults in October.

APPLE MAGGOT—Specimens taken at Morden, Man., in 1948 have been tentatively identified as this species. In Eastern Canada infestation was general where not controlled, particularly in eastern Quebec. Nova Scotia and Prince Edward Island, however, reported a marked decline in infestation intensity. Very few infestations were found in commercial orchards.

BLUEBERRY MAGGOT—This, the most serious pest of blueberries in New Brunswick, was more prevalent than in 1948 in Charlotte County where control measures are regularly carried out, and severe infestations were reported from northern areas of the Province.

APPLE MEALYBUG—Troublesome infestations persisted on Vancouver Island, B.C., and in the St. John River Valley, N.B. Two small but severe foci were found on Keswick Ridge, N.B., and a slight decrease was reported in Nova Scotia.

CHAIN-SPOTTED GEOMETER—Infestations on blueberry at Whittier Ridge and in the Utopia area of Charlotte County, N.B. increased tremendously in 1949.

CASEBEARERS—The cigar casebearer was observed in small numbers in neglected orchards in Ontario but was reported to be abundant in Quebec. The cherry casebearer was much less prevalent than in previous years in southwestern Quebec.

CHERRY FRUIT FLIES—*Rhagoletis cingulata* (Loew) was not as numerous as in previous years in Prince Edward Island and caused only slight damage to the cherry crop. *Rhagoletis fausta* (O.S.) was reared from wild red cherry at Morden, Man.

CODLING MOTH—Populations remained low in British Columbia, largely as a result of control measures. This condition prevailed also in Eastern Canada, generally, although the insect was more abundant and difficult to control than for several years on apples and pears in the Niagara district and Norfolk County in Ontario. It was still one of the major pests of apples in the Annapolis Valley, N.S. but occurred in greatly reduced numbers as compared with 1948, particularly in Kings County.

CRANBERRY FRUITWORM—About 35 per cent of the cranberry crop in Prince Edward Island was destroyed by this pest which was more abundant than usual.

CURCULIONIDS—The plum curculio severely infested plums at Brandon and Wawanesa in Manitoba. Serious damage was done to apples throughout Ontario and in Quebec the insect was considered to be the most destructive pest of the season on apples. Peach and plum were damaged more than usual in southwestern Ontario and, while control was good in the Niagara Peninsula, some severe local damage was done to ripening peaches. The apple curculio was a much less important pest in Ontario and Quebec. The strawberry weevil was recorded for the first time in Manitoba where it caused severe injury at Portage la Prairie and light injury at Morden. Some increase in damage to the strawberry crop was reported in Quebec. In the Maritime area, some extensive damage was done in Kent and Westmoreland counties in New Brunswick, and moderate damage occurred on strawberry and raspberry in Nova Scotia and Prince Edward Island. The strawberry root weevil caused considerable damage to strawberries on Vancouver Island, B.C., and, while generally abundant in Manitoba, was injurious to strawberries only at Roland. The black vine weevil also was an important pest of strawberry on Vancouver Island. Two native weevils, *Omias saccatus* Lec. and *Cryptolepidus parvulus* Van Dyke (*Cercopeus artemisiae* Pierce) seriously damaging seedling apricots, peaches and cherries at Summerland, B.C. by destroying the vegetative buds and in many cases killing the trees.

CURRANT BORERS—The currant borer was more abundant than usual in the Niagara Peninsula, Ont., and continued to cause serious damage to currants in the Charlottetown, P.E.I. area. Several adults of a tip borer *Psenocerus supernotatus* Say were taken at Brandon, Man.

CURRANT FRUIT FLY—Currant and gooseberry were so severely damaged in Saskatchewan that some growers destroyed their plantations. Damage was severe also in Manitoba, while in Ontario no reports of injury were received.

EYE-SPOTTED BUD MOTH—Bud moth was more troublesome than for several years at Kelowna, B.C. Damage was most severe on cherry; apple and prune being less severely attacked. Infestation was general throughout Eastern Canada and in many areas severe damage was done. These areas included eastern Ontario; Rougement, Abbotsford and St. Hilaire in southwestern Quebec; the Burton, Springhill and Douglas areas

of St. John River Valley in New Brunswick; and western Annapolis County and the Blomidon area of Kings County in Nova Scotia.

GREEN FRUITWORMS—Populations were at the highest level in several years in Nova Scotia.

IMPORTED CURRANTWORM—Infestations were reported to be light at Brandon, Man., spotty but somewhat more severe than in 1948 in southwestern Ontario, and comparatively light in Prince Edward Island and Newfoundland.

LEAFHOPPERS—The white leafhopper was of minor importance in Eastern Canada with the possible exception of Norfolk County, Ont. where it was abundant in some orchards. A bramble leafhopper, *Typhlocyba tenerrima* (H.S.), first recorded in the Victoria, B.C. district in 1947, was found 40 miles north of Victoria at Cowichan Bay, feeding on wild blackberry.

LEAF ROLLERS—The fruit tree leaf roller was readily controlled in areas where it had been prevalent in Ontario in 1948. Some severe infestations were reported in the Hemmingford area of Quebec but at St. Jean it was again of minor importance as compared with previous years of severe damage. The red-banded leaf roller was present in generally decreased abundance in Ontario, although a few apple orchards were severly infested in Norfolk County and the Niagara area. Peach and plum were lightly attacked in Essex County. This species was reported as a new pest in two orchards at St. Jean, Que. In New Brunswick, *Archips cerasivorana* (Fitch) was plentiful along most highways, while the oblique-banded leaf roller and *Pandemis canadana* Kft. occurred in small numbers near Fredericton. In Nova Scotia, the gray-banded leaf roller occurred more generally than in 1948 and caused some serious losses; *Archips persicana* Fitch was fairly abundant causing minor damage to apples; and the oblique-banded leaf roller and *Pandemis limitata* (Rob.) were present in moderate numbers.

MITES—The European red mite was again the major fruit tree pest in British Columbia being even more prevalent than in 1948. In Ontario spotty infestations on apple caused some severe damage. Poorly sprayed plum trees were also seriously affected and occasional injury was done to peaches. Increased abundance in many areas of Quebec made repeated spraying necessary. Only a few infestations were observed in New Brunswick and Prince Edward Island, but a general increase occurred in Nova Scotia. The Pacific mite caused considerable damage to raspberries on Lulu Island, B.C., apparently a new record for the coastal area, and medium infestations were general in the southern interior of the Province. This species previously reported as the red spider mite, was abundant on apples, raspberries and currants in Manitoba. The pear leaf blister mite was well controlled in British Columbia but was common in Nova Scotia and in Prince Edward Island where damage was moderate to severe. It was reported on apple foliage as well as pear in Nova Scotia. The two-spotted spider mite appeared in outbreak numbers on raspberries on Lulu Island and was more common than for several years in the interior of British Columbia, infesting fruit trees, cover crops, vegetables and flowers. It was present for the first time in appreciable numbers on peach in the Niagara area and occurred also on peach in Essex County, Ont. In Quebec it maintained its status as a minor pest. *Phyllocoptes schlectendali* Nal. failed to reappear in economic numbers in southern British Columbia. *Tetranychus willamettei* McG. was found for the first time in British Columbia at Summerland. The cyclamen mite severely infested strawberries at Morden, Man. An apple orchard near Burlington, Ont., was seriously injured by a mite determined as *Tetranychus althaeae* von Haustein, after McG.

ORIENTAL FRUIT MOTH—There was a marked reduction in both twig and fruit injury on peach in the Niagara Peninsula, Ont., resulting from a combination of biological,

insecticidal and natural control factors. Twig infestation was severe in Essex and Kent counties but fruit injury was much lower than in 1948. Injury to pears was negligible.

Peach Tree Borers—The western peach tree borer and the peach twig borer were less abundant than in 1948 in southern British Columbia. In Ontario the peach tree borer severely infested many orchards in Essex County but in the Niagara Peninsula and Norfolk County it was not unusually abundant. The lesser peach tree borer was very abundant in Essex County but caused little damage in the Niagara district.

Pear Psylla—Dry weather and insecticides effectively controlled this pest in British Columbia but considerable losses occurred in Ontario and in Nova Scotia where control was less effective.

Pear Slug—A severe local outbreak occurred at Bridgetown, N.S., and the insect was numerous in many areas of Prince Edward Island.

Raspberry Cane Borers—*Oberea bimaculata* (Oliv.) was more injurious than for several years in southwestern Ontario but was of minor importance in Quebec. *Oberea affinis* Harr. adults were scarce but larvae were common in Eastern Ontario, and the insect was prevalent in the Fredericton area of New Brunswick.

Raspberry Root Borer—This insect has been gradually increasing on raspberry and loganberry in the coastal area of British Columbia, and was reported from Birch Hills and Saskatoon in Saskatchewan.

Round-headed Apple Tree Borer—Young apple orchards were again seriously damaged throughout Quebec, in the St. John River Valley, N.B., and in several areas of Nova Scotia.

Scale Insects—Oystershell scale was of little importance in British Columbia, Ontario and Quebec in 1949, but in the Maritime area infestations were common and in many cases severe, although economic loss was light. San Jose scale caused the least injury in several years in British Columbia, and was abundant only in neglected orchards in Ontario. A slight increase in abundance of the cottony peach scale was reported in the Niagara, Ont., area but losses were small. A large soft scale, *Pulvinaria* sp. appeared in several apricot and peach orchards as well as on wild and ornamental plants in southern British Columbia, and the European fruit scale was reported as being scarce.

Shot-hole Borers—An infestation of *Scolytus sulcatus* Lec. on apple at Vineland constituted the first record of this insect in Ontario. In Nova Scotia, *Scolytus rugulosus* (Ratz.) caused the least injury to fruit trees in several years.

Tent Caterpillars and Webworms—Populations of the eastern tent caterpillar increased noticeably in eastern Ontario, but remained at a comparatively low level in the Maritime area. The forest tent caterpillar occurred in the Annapolis Valley, N.S., in the most severe outbreak in many years. The spotless fall webworm was common in moderate infestation from Manitoba eastward to the Maritimes. The ugly-nest caterpillar severely defoliated choke cherry and Saskatoon berry in the Saskatoon and Nipawin areas of Saskatchewan, and at Brandon, Carberry and Portage la Prairie in Manitoba. In the latter Province choke cherry and sand cherry were also severely infested by *Malacosoma lutescens* (N. & D.), particularly in the Spruce Woods and Brandon districts.

Willow Leaf Beetle—*Galerucella decora* (Say) was unusually abundant in Saskatchewan, damaging crabapple as well as poplar and willow.

INSECTS AFFECTING GREENHOUSE AND ORNAMENTAL PLANTS

APHIDS—At Saskatoon, Sask., *Kakimia wahinkae* Hottes was abundant on Delphinium; severe aphid infestations occurred on roses; and golden-glow and sweet pea were moderately infested.

A BORER—Some damage was done to rose shoots by *Papaipema* sp. in the Kamloops area.

CARAGANA PLANT BUG—Moderate infestations were present on caragana throughout Manitoba.

CHRYSANTHEMUM THRIPS—Serious damage was done to chrysanthemums grown out of doors at Victoria. This is the first record of the species occurring other than as a greenhouse pest in the area.

COLUMBINE BORER—This has been such a serious pest in Manitoba that many growers have stopped trying to grow columbine.

GLADIOLUS THRIPS—Gloxinia and cyclamen were attacked at Hepburn, Sask., and gladiolus in the Winnipeg, Man., area.

GREENHOUSE STONE CRICKET—The occurrence of this cricket at Prince Albert, Sask., constitutes the first record of the species in the Province.

GRAPE LEAFHOPPERS—Virginia creeper was again severely damaged at Kamloops and other areas in British Columbia; throughout southern Alberta; and at Saskatoon, Prince Albert, Rhein and other points in Saskatchewan. Columbine was also severely damaged at Saskatoon.

LACE BUGS—*Corythucha* sp. occurred in severe infestations on asters in Manitoba.

LILAC BORER—Winnipeg has been the main centre of infestation in Manitoba.

LILAC LEAF MINER—Reports of this lilac pest were received from Kamloops, Kelowna, Summerland and Trail in British Columbia, and it occurred commonly throughout Ontario and Quebec.

A MIRID—*Dicyphus pallicornis* Fieb. was recorded for the first time on Vancouver Island where it caused economic damage to the foliage of Digitalis.

MITES—The two-spotted spider mite was a year-round pest in greenhouses generally, and at Brandon, Man., the cyclamen mite severely damaged cyclamen plants in a greenhouse.

NARCISSUS BULB FLY—The infestation in British Columbia was the greatest ever experienced, reaching 60 per cent in some plantings.

ORANGE TORTRIX—This tortricid caused losses of geranium, carnation and a variety of other greenhouse plants in British Columbia.

PEAR SLUG—Infestations on mountain ash and cotoneaster were reported from Lethbridge, Calgary and Red Deer in Alberta.

RED-HUMPED CATERPILLAR—Virginia creeper was commonly infested at St. Jean, Que.

ROSE CURCULIO—Reports of severe damage to roses were received from Zealandia, Watson and Sutherland in Saskatchewan, while in Manitoba infestations were reported to be lighter than in 1948.

SCALE INSECTS—Soft scale continued to increase where D.D.T. was applied to control holly leaf miner in British Columbia. Oystershell scale severly infested cotoneaster at Lethbridge, Alta.

INSECTS AFFECTING MAN AND DOMESTIC ANIMALS

Bed Bug—This household pest, fairly common a few years ago, is now rarely reported.

Black Flies—Outbreak numbers of *Simulium arcticum* Mall. emerged from the South Saskatchewan River in the vicinity of Fenton on June 5 and 6 and killed 12 head of cattle in the Melfort district, some 35 miles distant. *Simulium vittatum* Zett. was the predominant species in northern Saskatchewan throughout the summer months and caused some annoyance to live-stock and man. *Eusimulium* sp. appeared in large numbers along the South Saskatchewan River in the Saskatoon district during the last week of April, two weeks after the ice left the river, and attacked man and live-stock. A minor outbreak of *S. venustum* Say occurred at La Ronge during the week ending June 7 but caused little annoyance to man or live-stock. In Manitoba an outbreak of *S. venustum* Say occurred along the Souris River from Melita to Treesbank. The flies were so abundant that they caused some herds of cattle to stampede. A smaller outbreak occurred along the Pembina River in the Pilot Mound area. Black flies were prevalent in eastern Ontario in the spring but adult populations were reduced by dry weather in early summer.

Bot Flies—The common species continued to annoy and infest horses generally.

Deer Flies—*Chrysops* spp. were less abundant than in 1948 in Saskatchewan, but were present in Ontario in increased abundance.

Fleas—Occasional infestation of *Pulex irritans* L. were reported from coastal areas of British Columbia. *Ctenocephalides* spp. were less prevalent than usual in Ontario.

Horn Fly—This cattle pest was generally abundant in Eastern Canada.

Lice—Although a general decline in the incidence of head lice has been noted in Ottawa, infestations of this parasite accounted for 630 exclusions in the city's schools during 1949. The body louse was reported from Trail, B.C., and the dog louse *Linognathus piliferus* Burm. from Prescott, Ont.

Mosquitoes—Water run-off was normal in the Kamloops, B.C., area and no unusual mosquito outbreaks were reported. Populations have diminished greatly in recent years in the Summerland, B.C., area, believed to be a result of the use of D.D.T. in orchard spraying. Mosquitoes were almost non-existent in the spring of 1949 in Alberta as a result of very light snowfall, but extensive populations developed following heavy rains in July. In Saskatchewan a hibernating species, *Anopheles occidentalis* D. & K. was reported from several locations in April but, as in Alberta, the spring was dry and mosquitoes were not troublesome until late summer when some annoyance developed, notably at Canwood. In Manitoba surface water was abundant and mosquitoes were plentiful. In eastern Ontario mosquitoes did not become abundant until June when *Aedes hirsuteron* Theo. emerged from flooded areas of the Ottawa and other rivers. Populations were below average in Prince Edward Island.

Tabanids—While reportedly less abundant than in 1948 in Saskatchewan, horse flies emerged in large numbers in Ontario and were more annoying than usual to live-stock.

Ticks—There were few cases of tick paralysis in British Columbia although populations of the Rocky Mountain wood tick were believed to be normal. There was one fatal case, a child, at Kamloops. The winter tick caused considerable trouble among cattle, horses and deer in the Cariboo and Kootenay districts during early spring. *Ixodes pacificus* Cooley and Kohls caused much annoyance in residential areas of the lower mainland and *Ornithodoros hermsi* Wheeler, Herms and Meyer,

only recently recorded in British Columbia, was collected at Summerland, Kamloops and Cultus Lake. Humans were attacked in three cases. Several cases of ticks infesting horses were reported in Saskatchewan. Enquiries regarding the American dog tick were more numerous than usual in Manitoba. A specimen of *Ixodes cookei* Pack. was removed from a child's ear at Ottawa and a specimen believed to be this species was removed from a child's back at Lucknow in Ontario, while at St. Jerome, Que., a species of *Ixodes* was reported to be infesting dogs.

WARBLES—*Hypoderma* spp. continued to be abundant throughout the Dominion. Seven cattle died on one farm in Manitoba as a result of magpies picking at warble wounds, while in New Brunswick a third instar larva of *H. bovis* (Deg.) was found infesting a child.

HOUSEHOLD INSECTS

ANTS—On the basis of numbers of enquiries received, the ant ranked first among the insects as a household pest in most parts of the Dominion. Among other species, the Pharaoh ant and black carpenter ant were frequently reported from Manitoba eastward. The former seems to be increasing in distribution and abundance. An uncommon species *Lasius* subgenus *Acanthomyops* was found infesting a dwelling in Toronto, Ont.

CARPET BEETLES—Infestations were commonly reported throughout the Dominion, the black carpet beetle being the most prevalent species.

CLOTHES MOTHS—Reports of infestations were generally distributed and numerous. The casemaking species would seem to have been the more common in Manitoba and Quebec.

CLOVER MITE—Hibernating mites were again a common household pest, mainly in the Prairie Provinces.

CLUSTER FLY—Infestations of hibernating adults were again common in Eastern Canada, although they were less prevalent than usual in the Ottawa area, probably a result of dry weather during early summer.

COCKROACHES—On the basis of numbers of enquiries received, the German cockroach ranked next to ants as a household pest in urban areas of Eastern Canada. The oriental roach was reported in Ontario and Quebec, the Australian roach at Hamilton and St. Catharines in Ontario, and a single live specimen of the Cuban cockroach was taken in a bunch of bananas at Montreal, Que.

A FRIT FLY—*Chloropisca annulata* Wlk. occurred in dwellings in Regina, Sask. and Barrie, Ont.

HOUSE CENTIPEDE—A few isolated specimens were reported at Ottawa.

HOUSE FLY—Populations were greatly increased in most provinces in 1949, the result of a favourable season, relaxed sanitation and probably some resistance to control chemicals.

MIDGES—Chironomids were very abundant and annoying to residents in cottages and to picnic parties along Lake Erie.

MILLIPEDES—Buildings in the path of an unusual migration of thousands of millipedes were invaded at Buckingham, Que.

SEED-CORN BEETLE—Adults became a nuisance in a dwelling at Oshawa, Ont.

SILVERFISH—Many reports were received from urban areas in Ontario and Quebec.

STRAWBERRY ROOT WEEVIL—Adults seeking hibernating quarters were a frequent nuisance in dwellings from Saskatchewan to Quebec.

TERMITES—Some increase was indicated in the area of the infestation of *Reticulitermes flavipes* (Kollar) in Toronto, Ont.

TWO-SPOTTED LADY BEETLE—Hibernating adults of this species were particularly abundant in some areas of Eastern Canada.

WASPS—Some species were reported to be a greater household pest than usual in eastern Ontario, and abundant in Manitoba.

WOODBORERS—Powder-post beetles, *Lyctus* sp., would seem to be becoming an increasingly common pest of wooden structures in Eastern Canada. *Anobium* spp. occurred in furniture and dwellings in Quebec and Nova Scotia, and an unidentified species infested bamboo containers of bulbs from China. An infestation of the wharf-borer occurred in an office building in Ottawa.

STORED PRODUCTS INSECTS

STORED GRAINS—There was rather rapid movement of Canadian grain through storage facilities during the season of 1949, and as a result of this factor as well as continuous inspection and the application of control measures when necessary, it was comparatively free from grain storage pests. Because of a bountiful crop and a lack of storage facilities in United States a considerable amount of U. S. grain was placed in storage in Canadian elevators principally in the Bay Port area during July, August and September. Insect infestation developed in this material to such an extent by November and December that it was necessary to fumigate a very considerable amount of it to prevent infestation of Canadian grain stored in the same facilities. The principal insects were the rice weevil, the granary weevil, the flat grain beetle, the rusty grain beetle, and an occasional specimen of the lesser grain borer.

There was very little weevil infestation in western Ontario in locally grown wheat. There has been a strong demand for this type in the manufacture of pastry flour and in recent years it has all passed into commercial hands shortly after threshing where is was closely watched and fumigated if necessary.

Feed grains in storage on farms in Ontario were commonly infested by the granary weevil, the rice weevil, the saw-toothed grain beetle, the cadelle and species of *Tribolium*.

The insects most frequently found during the inspection of residues in grain storage boats at Fort William and Port Arthur, Ont., were the dark mealworm, the meal moth and the yellow mealworm.

MILL INSECTS—A survey of 37 flour mills of varying sizes in the Province of Ontario in 1949 indicated that the confused flour beetle, the flat grain beetle and the Mediterranean flour moth were the principal insect pests in plants where flour is manufactured. In addition to these, the yellow meal worm, the cadelle and the black carpet beetle were recovered in varying numbers in the plants inspected. Only 38 per cent of the plants were considered to meet acceptable standards for food sanitation. A carload of 760 bags of flour destined for Great Britain was rejected at Saint John, N.B., on account of an infestation of the confused flour beetle.

SPIDER BEETLES—In British Columbia, *Ptinus ocellus* Brown continued to be the species most frequently encountered both on the mainland and on Vancouver Island. The spider beetle problem in the Prairie Provinces has been greatly reduced by the widespread and continuous use of 5 per cent D.D.T. in water suspension or emulsion form. In Eastern Canada several infestations of spider beetles were encountered. The

hairy spider beetle and another species, *Ptinus raptor* Sturm., were responsible for most of the infestation. *Mezium affine* Boiel. infested a dwelling at Saint John, N.B. The golden spider beetle was not reported in Saskatchewan in 1949.

DERMESTIDS—Very little infestation of *Trogoderma versicolor* (Creutz.), was encountered in powdered milk plants during 1949 in spite of the increased storage stocks. Infestations of the larder beetle in dwellings were commonly reported.

The BEAN WEEVIL was present in the usual numbers in stored beans. Many of the infestations occurred rather late in the season in stocks which had apparently not been carefully inspected and as a consequence a considerable amount of material was affected.

The SAW-TOOTHED GRAIN BEETLE caused considerable infestation in both homes and stores during 1949. Because of its small size, it is able to penetrate many packages and infest a variety of materials.

DRUG-STORE BEETLE—Infestations were frequently reported in Eastern Canada particularly in urban areas.

TOBACCO MOTH—The use of D.D.T. in tobacco warehouses where tobacco is stored in hogsheads has been successful in the control of the tobacco moth. There has been an over-all reduction in moth population and some of the warehouses are now essentially free from the pest.

CIGARETTE BEETLE—An extensive infestation occurred in a tobacco store at Kirkland Lake, Ont.

ODD BEETLE—This beetle was reported in Alberta for the first time when it was found destroying insect specimens in the University collection. It occurred also at Ottawa, Ont., where it damaged valuable prints in the National Gallery.

YELLOW MEALWORM—This species was occasionally reported in Saskatchewan; infestations were found in several warehouses in Charlottetown and Montague, P.E.I., and in straw-stuffed furniture at Belleville, Ont.

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96th ANNUAL REPORT

of

The Horticultural Societies

also

Report of Ontario Horticultural Association

1949

ONTARIO

Printed by order of
COLONEL THE HON. THOMAS L. KENNEDY,
Minister of Agriculture

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Col. The Hon. Thomas L. Kennedy,
Minister of Agriculture, Ontario.

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6................Brant, Halton, Wentworth
7................Dufferin, Waterloo, Wellington
8................Bruce, Grey, Huron
9................Haldimand, Lincoln, Norfolk, Welland
10................Elgin, Middlesex, Oxford, Perth
11................Essex, Kent, Lambton
12................Cochrane, Nipissing, Temiskaming
13................Algoma, Manitoulin, Sudbury
14................Kenora, Rainy River, Thunder Bay

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1946— Mrs. D. A. Gillies, Arnprior
1947— Howard Hartry, London
1948— Percy Bone, Thornhill
1949— A. F. Johnson, Stamford Centre

* Deceased.

ONTARIO HORTICULTURAL ASSOCIATION OFFICERS

Left to Right: A. J. Jackman, Robt. D. Little, Rev. E. Rigby (President), A. F. Johnson and H. Occomore.

PRESIDENT'S ADDRESS

A. F. JOHNSON, *Stamford Centre.*

IT is a pleasure to welcome you to this our 44th Annual Convention, and sincerely trust each delegate will receive valuable information, and a safe return home filled with zeal and determination to carry on our good work of horticulture.

Through gatherings such as this we have opportunity to exchange ideas and broaden our scope of usefulness. We cannot survive living alone in an isolated community, but must, with other Societies, passing along information and ideas that have been proved successful.

Today is a very significant one in the history of this Association. One hundred years ago a group of Hamilton citizens formed a Horticultural Society, and this has been carried on through many years, giving valuable assistance to the community. Success does not come easy, and in spite of handicaps and difficulties the Society has survived. We join on this occasion in wishing continued success in their inspirational work.

We have other Societies celebrating anniversaries this year. It is splendid to think that Guelph attains 50 years, and Scarboro a silver anniversary, so to both we offer hearty congratulations.

I have had opportunity to visit many local Societies, and attend some District Meetings in various parts of the Province. The reports have been most encouraging. Societies are congratulated on their excellent work, including membership drives, civic beautification, competitions, flower shows and monthly meetings. The year 1949 has been a progressive one, largely due to services rendered by our Societies to many centres represented at this convention.

We should give more attention to juvenile work, as it has been a surprise when attending meetings to note the absence of young people. If we expect to carry on successfully in coming years, more juniors should be receiving instruction and experience. Such training is being given by the Brantford Society, where 27 boys and girls meet monthly for instruction.

Our Conservation and Reforestation Committee is doing fine work, and a great deal of credit is due Mr. J. E. Carter for his untiring efforts.

This year, as in the past, this Association sent food parcels to aged gardeners in England who are on pension. These parcels have been greatly appreciated, and if more Societies could read the letters of thanks, the contributions would more than double.

In conclusion, I would like to express our thanks to Col. The Hon. Thomas L. Kennedy, Minister of Agriculture, for financial support in the way of grants to this Association and Societies.

My personal thanks go to Mr. J. A. Carroll and his Secretarial Staff, to Mr. John F. Clark, our Fieldman, and to the Officers and Directors for their loyal support in making my year a pleasant one.

The year 1949 will always be remembered as one in which I associated with many interested horticulturists working for the good of our Province. Friendships have been made, and I am resolved that my interest shall continue active in the work of beautification.

REPORT OF SUPERINTENDENT AND SECRETARY

J. A. CARROLL.

THIS is the most encouraging report presented for some time. In the year seven new Societies were organized, and after allowing for some which became inactive, there was a net gain of ten in the number receiving grants. Over half of the Societies reported an increase in membership. The total membership for 1948 was 28,612, an increase of 2,587 over 1947.

Membership by Classes, 1948

City		*Town*		*Village*		*Township*	
Waterloo	1179	Orillia	455	Ayr	257	Scarboro	440
Chatham	1011	Wallaceburg	385	Thornhill	252	Clover Leaf	311
Ottawa	1007	Barrie	380	Port Elgin	172	Guelph	271
Kitchener	926	Bracebridge	334	Watford	167	Bertie	226
Guelph	800						

Commendable Membership, Northern Ontario

City		*Town*		*Village*	
Port Arthur	310	Bracebridge	334	Sioux Lookout	154
Fort William	262	Huntsville	300	Kapuskasing	150
Sault Ste. Marie	255	Fort Frances	250	Espanola	116

New Societies: Gravenhurst, Deep River, Fort Erie, Espanola, Bruce Station, Merritton.

Societies dissolved: Lorne Park, Innisfil Township, Beamsville.

Grants were paid to 182 Societies, and calculated as indicated. The rates were lower because of increased total membership and expenditure.

	1949	1948
Members	15.4c per member	16.5
On Horticultural expenditure	15.1%	17.2%

Congratulations are extended to three Societies which were revived: Smithville, Ilderton, Adelaide Township.

The following 14 did not qualify for grants: Paris, Wyoming, Port Carling, Sunnyside, Hearst, Delhi, Eganville, Vinemount, Belle River, Vespra Township, Washago, Belleville, Bolton, Haileybury.

SOCIETY ACTIVITIES

A study of Society programmes reveals an improvement in rendering greater service. There was an increase in civic planting and more juvenile promotion.

The average number of Board meetings held by Societies was five, and an average of three open meetings were held featuring illustrated and other addresses, films and demonstrations.

Reference

To provide a reference for those planning to improve programmes or new activities, a few Societies are listed under each main activity division.

Civic Beautification—70% of Societies

ANGUS—Maintaining and planting Memorial plot. BARRIE—Complete new planting at entrance to Fair Grounds. BEETON—Trees in cemetery, windbreak at church. BILLING'S BRIDGE—Bulbs, shrubs, benches and lawns in Coronation Park. BLENHEIM-HARWICH—Planting and other work at new park. COLLINGWOOD—Hospital, C.N.R. Station, Post Office, Library. CAMPBELL TOWNSHIP—Trees around the church yard. CHATHAM—Beautification of Fairfield site, Highway No. 2. DRESDEN—Legion Hall, cenotaph, athletic park, schools, post office. DOWNIE TOWNSHIP—Planting at cemetery. FENELON FALLS—Maintaining rock garden, improvement work at cemetery. FORT ERIE—Hospital, town hall, library. GALT—Maintaining paeony plot, 25 beds on streets. GANANOQUE—Gates maintained and planting Memorial plot. ERIN—Nine street beds. KITCHENER—County buildings, St. Mary's Hospital, Society gardens. MIMICO—Maintain War Memorial Park. NORTH TORONTO—Vegetable garden at Humewood House, flowers to Sunnybrook. OIL SPRINGS—Plot at station, beds on highway, school. PETERBOROUGH—Sponsored factory competitions, two classes. PELHAM TOWNSHIP—Planting at church, schools, cemetery. RENFREW — Planted 500 maples on new streets. STRATFORD—Flower beds, urns, boxes. SMITHS FALLS—Society Memorial plot, also flower plots in parks. STREETSVILLE—Cleaning up river bank, also unused cemetery.

Shows—65%

While the unprecedented drought in some areas forced a cancellation of some shows, and reduced entry at others, a broad show programme was carried through successfully.

The officers of the Canadian Gladiolus Society are congratulated on the success of their show in Guelph, August 19th and 20th.

BARRIE—Five window displays of seasonable flowers instead of show. CHATHAM—Joint District show from Petrolia, Ridgetown, Blenheim, Corunna. COLLINGWOOD—Show in conjunction with Great Northern Exhibition. ESPANOLA—New Society. Flower and vegetable show. FORT WILLIAM —Rose show was a delight to the community. FORT FRANCES—Fall show —flowers and vegetables, handicraft, cooking, fruit. GUELPH—Host to Canadian Gladiolus Society show. GALWAY AND SOMMERVILLE—The best since organization. HIGH PARK—Iris, rose, summer and dahlia shows in season. MILLE ROCHES—Annual show, with 174 entries from the children. NEWCASTLE—Tulip, daffodil, paeony, rose annual shows. NEWMARKET— Two shows, one featuring art work of Grades I—at iris show. At the gladiolus show it was a floral arrangement for school children. NORTH YORK—Eight monthly shows—600 square feet at C.N.E. OSHAWA—Held five shows during the year, and a section for children. PEMBROKE—Tulip, iris, paeony, rose, delphinium fall shows. ROSELAND—Art exhibit at fall show. RICHMOND HILL—Daffodil, tulip, spring, summer, fall shows. SUNNYLEA—Four shows for seniors, one for juniors. STIRLING—Held show in conjunction with Agricultural Society. TIMMINS—Held 25th show, with 1,104 entries; one of the best on record. WATERLOO—Junior show and floral arrangement contest at same.

Winners Society Classes, C.N.E.

Class 247—Section 1—Basket of Flowers:

August 29th: 1st, Stouffville; 2nd, Roselands; 3rd, North Toronto; 4th, Thornhill.

Sept. 1st: 1st, North Toronto; 2nd, Stouffville.
Sept. 5th: 1st, Stouffville; 2nd, North Toronto.
Sept. 8th: 1st, North Toronto; 2nd, Stouffville.

Garden Competitions—35%

FORT FRANCES—War housing competition. LITTLE CURRENT—Home property improvement competition. NORTH TORONTO — Six garden competitions, eight monthly shows. SIMCOE—School children's garden competition. PETERBOROUGH — Lawn and garden competition. NEWCASTLE — Best kept vegetable garden. SMITHS FALLS — Forty-three junior garden plots. PEMBROKE — Improvement of home grounds. ELORA and SALEM—Garden contest open to all members. OTTAWA—School Garden Club competition. ESPANOLA—Best garden showing greatest improvement. MILLE ROCHES—Juvenile garden competition, 103 entries. PORT ARTHUR—Garden competition in seven sections. CORNWALL—Three competitions—large gardens, small gardens, best appearance from the street.

Junior Activities—70%

Junior shows held separately or as part of regular shows were held by 60 Societies.

ARNPRIOR—Three junior shows. DUNNVILLE—Junior show, based on seeds supplied to pupils. HESPELER — School garden plots. FLAMBORO TOWNSHIP—Classes for juniors in shell craft and weed collection. SIMCOE —Junior show. SIOUX LOOKOUT—Flower and vegetable show. TIMMINS—Flower and vegetable garden competition. SANDWICH EAST — Junior school gardens.

Other Junior Activities

ARNPRIOR—Children's garden competition—77. BERTIE TOWNSHIP—Junior garden contest. BEAVERTON—Seeds to school children. FORT FRANCES—Programme to encourage flower growing, hobbies, handicraft. BOBCAYGEON—Bird house competition. NEWMARKET—$50 of bulbs to schools. SCARBORO—Juvenile work, hobby show. SIMCOE—Children's garden competition. ORO—500 packets of seed to township schools.

Service to Members and to the Public

BERTIE TOWNSHIP—Street containers for trash. Making of Christmas decorations. BRANTFORD—Garden hints—monthly. CLOVER LEAF—Distribution of fertilizers, magazines. GORDON TOWNSHIP — Clean-up, weed eradication. KAPUSKASING—Provided weed killers and fertilizers to members. NEWMARKET—Clean-up week. Books and magazines to library. Purchased garden stock, planted trees. PRESTON and MERRITON—Placed floats in local parades. RICHMOND HILL — Timely garden notes with each meeting notice. SCARBORO—Extension programme of meetings in schools of area. SAULT STE. MARIE—Provided judges for V.L.A. contest. EAST YORK—Bulletin—Society news and hints. WOODSTOCK—Monthly garden hints.

Stamford is congratulated on the establishment of the "Stamford Green Memorial Garden" and the impressive Memorial and Investiture Service on Sunday, Aug. 7th, at which Col. the Hon. Ray Lawson, Lieutenant-Governor of Ontario, officiated.

Society Anniversaries

Hamilton is this year celebrating a centenary anniversary. Unfortunately the official reports do not go back for 100 years, but the year book of 1863 includes Hamilton as active at that time.

Elmira had a banquet celebrating 51st anniversary. One charter member was present.

Guelph, on Feb. 28th, held a dinner celebrating 50th anniversary, but it is believed this Society was active before the turn of the century.

The following Societies are at least 25 years of age: Timmins, East York, Stouffville, Scarboro, Arthur, Pembroke, Parry Sound, Erin, Kincardine, Tara, Lucknow, North York, Oro Township.

ONTARIO HORTICULTURAL ASSOCIATION

Association Awards

An O.H.A. silver medal and diploma has been awarded to Mr. Kirk Coward of Kingston. Each school winning a first prize in an Association Improvement Competition was awarded a diploma.

District Meetings

Meetings were held in all O.H.A. Districts except Nos. 12 and 14, which covers the large area west of the Great Lakes. The largest attendance was in No. 5, with 19 Societies represented, and total delegates 300. The percentage of Societies represented is a fair comparison, and in this No. 13 was in first place, with only one Society not represented.

On request, and as provided by the constitution, election of Director was conducted by mail for Districts 10, 12 and 14.

School Ground Improvement Competition

366 entries in local—11 entries in Provincial.

Prize Winners—Provincial Competition

School, prize and teacher:

1—S.S. No. 5, Wainfleet, Welland—J. E. Carter Trophy—Miss J. A. Carlin.

2—S.S. No. 3, Proton, Grey — Hon. P. M. Dewan Trophy — Bruce Russell.

3—S.S. No. 2, Derby, Grey — T. Eaton Co. Ltd. Trophy — Mrs. A. Ireland.

4—S.S. No. 9, Elderslie, Bruce—T. Eaton Co. Ltd. Trophy—Harvey Neil.

Certificates provided by the O.H.A. were presented to schools selected by school inspectors for having the best kept grounds in their respective townships.

Conservation

Under the chairmanship of Mr. J. E. Carter, your Conservation Committee presented an excellent brief to the Select Committee of the Legis-

lature studying conservation. A report of Mr. Carter's committee will be presented with copies available for delegates.

School Forestry Competition Prize Winners

230 entries in zone competitions, an increase of 98 over 1948; 6 entries in Provincial contest.

Provincial Winners

School	*District*	*Local Entries*
1—S.S. No. 12, Haldimand, Northumberland	4	5
2—S.S. No. 11, Woolwich, Waterloo	2	145
3—North Walsingham Public School, Norfolk	1	7
4—S.S. No. 2, Faraday, Hastings	5	61
5—S.S. No. 10, Roseville, Ontario	3	6
6—Athens Public School, Leeds	6	6

Jackman Windbreak Competition

This new feature, initiated in 1947, and for which substantial prizes were offered by A. J. Jackman, District Director No. 8, had 12 entries this year in the Counties of Bruce and Grey. The first prize of $50 was won by Mr. Laverne Hewitson, Owen Sound.

Wild Flower Essay Competition

There were 18 competitions, with 542 entries, compared with 160 in 1948. Interest was thus aroused in areas as widely reported as the Ottawa Valley and Rainy River.

Name	*Society*	*Score*
1—Sheryle Crozier	Cobden	78
2—Reta Martin	Elmira	77

S.S. No. 2, Thorah Twp., Ontario County. Winner J. E. Carter Trophy for School Ground Improvement Competition, 1938. Before improvement.

3—Ross McGregor	Fort Frances	73
4—Marlene Lindstron	Fort William	71
5—Yvonne Card	Guelph Township	70.2
6—Darliene Stuffles	Newmarket	67
7—Rickey Elliott	Clinton	66.2
8—Helen Colson	Deep River	66
9—Connie Shouldice	Eastnor Township	63.2
10—Marvin Daboll	Pelham Township	62
11—Patricia Millen	Scarboro Township	61.1
12—Gordon Macy	Bertie Township	60
13—Nancy Bittle	Dunnville	58.2
14—Marlene Page	Stratford	58
15—Ronald Wallberg	Fort William	55.1
16—Nellie Holubenko	Newcastle	54
17—Joyce Johnston	Smiths Falls	51.2
18—Myles O'Grady	Blind River	50

British Fund

The third shipment of parcels was forwarded to gardener pensioners in England in March, and 200 letters of appreciation were received by the secretary. Another shipment has been ordered to go forward immediately. Summary:

Shipment 1—August, 1947—876 lbs.	$293.40
Shipment 2—June, 1948—225 parcels	380.76
Shipment 3—March, 1949—221 parcels	338.74

Expressing thanks for previous co-operation, and reporting that maple seedlings in Britain were doing well, the Imperial War Graves Commission asked assistance in planting stock for cemeteries in France containing graves of Canadian personnel. By kindness of the Ontario Department of Lands and Forests, 1,200 maple seedlings are going forward now. The Experimental Farm, Indian Head, Saskatchewan, provided us with Caragana seed for hedges.

Same School—Six Years Later—1944.

ASSOCIATION SERVICES

J. Lockie Wilson Trophy Presentation

The second award was presented by the Secretary at a College function on March 26, 1949, to: J. M. Saville, H. A. Carruthers, K. L. McGregor (4th year O.V.C.), A. G. McKay.

Service diplomas were provided and engrossed for 36 Societies. Record books and refills to eight Societies only. The attention of newly-elected secretaries is directed to this service.

Projector and Kodachrome Slides

There are 186 slides available at present. These are of a mixed nature as there are not sufficient specialized slides to make up sets on single topics such as roses, tulips, dahlias, pruning and kindred subjects. Lanterns and slides have been used on 14 occasions during 1949. Slides are now being bound in glass so as to protect same from marks by fingering. Those having kodachrome slides they would like to donate or loan for the purpose of making prints should get in touch with the Secretary, J. A. Carroll.

This substantial record of one year's achievements could not have been realized without the co-operation of supporters and friends. On your behalf we extend thanks to the press and radio, also to donors and other co-operators. Personal appreciation is expressed to members of the Board and our staff who have gone forward as a team, and lightened the load on any one member. Your President deserves special mention, as he has been most energetic in your interests. He put aside personal responsibilities, and ignored distance when a call came or an opportunity was presented to promote our common cause.

This should be more than an annual stock-taking as we enter the second half of the century, for it is Atom Year 5 and, more awe-inspiring "H Year" 1. As we ponder the inestimable possibilities of fuller and happier lives, and the perplexing dangers of international distrust and destruction, on one point there should be no uncertainty: *Beauty will be needed as never before.*

ONTARIO HORTICULTURAL ASSOCIATION

Financial Statement—January 1 to December 31, 1949.

RECEIPTS

Balance on hand, January 1, 1949	$ 269.48
Membership fees, 1949	406.22
Bank exchange	11.85
Record book supplies	27.83
School Forestry Comp. (J. E. Carter and O.C.R.A.)	425.00
Food for Britain	434.00
Trillium cut	1.50
Banquet (528 at $2.50)	1,320.00
Donations	50.00
Refund, Canadian Passenger Association	18.75
Sale of bond	1,032.32
Grants (Provincial Government, $150; City of Toronto, $100)	250.00
Trophy (Hon. P. M. Dewan)	18.50
Membership fees, 1950	534.00
TOTAL	$4,799.45

EXPENDITURES

School Forestry prizes	$ 300.00
Loan (Guelph Horticultural Society)	300.00
Supplies	49.25
Printing and stationery	85.37
Badges for Convention	50.00
Bank exchange	26.88
Directors' expenses	369.63
Banquet (587 at $2.50)	1,467.50
Banquet expenses	165.00
Convention expenses	95.00
Guarantee, Canadian Passenger Association	18.75
Medals and trophies	53.25
Safekeeping	2.00
Food for Britain	338.74
Honoraria (Treasurer, $100; Secretary, $50)	150.00
School Ground Beautification Competition	13.86
Postage	30.00
Fidelity bond	12.50
Sundries	35.97
TOTAL	$3,563.70
Balance	$1,235.75

STATEMENT OF ASSETS AND LIABILITIES

Balance in bank	$1,311.08		
Outstanding cheques	75.33		
	$1,235.75		
Bond in safekeeping—	1,000.00		
		$2,235.75	
*Accounts receivable		561.56	
			$2,797.31
**Accounts payable			906.42
Balance			$1,890.89

Audited and found correct,

A. C. SHANTZ,
R. G. STEPHENS,
Auditors.

*Received since Jan. 1, 1950, $250, leaving balance of $311.56.
**Paid since Jan. 1, 1950, $4.50.

Guelph, January 1, 1950.

SMALL HOLDING DEVELOPMENT

A. C. NORCROSS, *Ottawa.*

IT is a pleasure to be present and express appreciation to the Ontario Horticultural Association for the opportunity to mention V.L.A. 1950 plans for development of small holdings.

The 1949 Small Holding Development and Beautification Competition was an acknowledged success. With a view to furthering community and individual interest in such work similar competitions on a modified plan will be a feature of 1950. We owe much of our success to the generous assistance tendered by the Horticultural Societies, and it is a pleasant duty to extend the thanks of the Minister, the Hon. Milton Gregg, and our Director, Brigadier T. J. Rutherford, for your generous co-operation in these competitions.

The general improvement shown in the development of small holdings is indicative that the majority of veterans, who obtained assistance under the Veterans' Land Act, are extremely interested in this way of living and are working towards a worth-while permanent estate. To encourage this splendid reaction the V.L.A. launched an intensified development programme which will point the way to increased income, property improvement and better living conditions. In order to better prepare our 320 Field Supervisors for this work, courses are being held in each province, the aim of which is to show the veteran how he can have a better small holding.

In approaching our problem of working with 18,000 veterans across Canada, we analysed a large number of small holdings to determine what made their particular development stand out, and found about 20 factors present in the best cases—these we call "The Steps in Development". Such

include both agricultural and landscape factors, as we encourage a well-balanced property, a setting for the home, a vegetable garden for the veteran's own use, and finally the growing of some specialized income crop which will bring in a secondary income.

Aid Veterans

We also help the veteran to arrange the factors in a logical manner and see that the plan has unity, and aid in selection of the best planting material. To do this we are giving Field Supervisors further instruction and tools to aid in demonstrating fundamentals to the veteran. Each Settlement Supervisor will have a model kit of planting material. This will help the small holder in layout of property, illustrating basic fundamentals of landscape design, and eliminate the trial and error method, which is costly and discouraging.

The Illustration Folder published by our Department will contain over 120 coloured prints of selected trees, shrubs and flowers, and when used with the model will enable the veteran to make selection of material and draw up a suitable plan at that time.

Included in our plans, provided necessary authority for funds is obtained, is a scheme to establish a demonstration small holding in each of our eight districts. We hope to select the property of a willing veteran who may be severely handicapped through war disabilities, or possibly a widow who may be carrying on her husband's contract with the Department, and after careful planning carry out the complete development of this property. The only stipulation is that they permit their neighbours and other small holders to visit the demonstration small holding to examine what can be accomplished when the basic fundamentals of landscaping and horticulture are followed. If permitted to proceed with this project, it may be necessary to call on your Societies for further assistance. In view of your aid in 1949, we are assured of your co-operation.

OBSERVATIONS AND SUGGESTIONS

JOHN F. CLARK, *Ontario Dept. of Agriculture, Toronto.*

THE Programme Committee has asked that this report take the form of a discussion on *How to Kill a Society.* References will be made to some weaknesses in organization, but first a few words must be said of the good work being done in most parts of the province.

Membership

The membership continues satisfactory, particularly in the more active Societies. Executives state there is no difficulty in securing members where personal contact is made. On the other hand, 60 Societies show a decrease in membership for the year, which may indicate the Society has lost some of its appeal, or stands in need of a drive for new members.

Public Addresses

The number of requests for addresses of various kinds, and the good attendance at such meetings, are proof of the keen interest in Horticulture and Beautification. Apparently all types of organizations are conscious

that their members love flowers, and that such a topic will hold the interest of an audience. Demands are many, and it is almost humanly impossible to keep pace with requests for assistance.

In view of figures to be submitted, it would appear our Societies overlook golden opportunities to serve the community and advertise their organization. We must still remember that the open meeting is the classroom of the Society.

Shows and Competitions

Continuous dry weather did much to defeat annual flower shows in 1949. In spite of hot weather and lack of rain, many Societies held very successful shows, the quality and quantity of material being of a high order. Some shows and garden competitions had to be cancelled.

Mention should be made of the visit of District Directors Wm. Brown, Russell Heard and Albert Jackman to the Timmins Flower Show. The McIntyre Arena was filled with exhibits and displays of good quality arranged in an attractive manner. These flowers, fruit and vegetables proved a good example of what can be grown five hundred miles north of Lake Ontario.

(a) *Rural School Ground Competitions*

This feature of the work continues to bring outstanding results, and presents an excellent opportunity to meet teachers and pupils in hundreds of schools. Inspectors and Boards continue to give active support to teacher-pupil efforts. The winner of the Carter Trophy, S.S. No. 5, Wainfleet, is splendid proof of what can be done in beautification of school property. Nothing should be done to jeopardize our rural work, for results justify time, energy and awards.

(b) *Wild Flower Essays*

This competition is becoming better known with more participating. Pupils are keen to take part. It remains for local Societies to provide the leadership. The beautiful prizes offered so generously by Mrs. D. A. Gillies is a rich reward to any child fortunate enough to be a winner in the Provincial Competition.

(c) *School Forestry Plots*

Rural pupils are displaying exceptional interest in this project, and it has been a pleasure to examine some of the plots. Particular mention is made of S.S. No. 12, Haldimand, three times Provincial winner. Trees planted the first year, 1945, are gaining height, rows are regular and clean throughout the acreage, and carefully watched by teacher and pupils. The leaf collections are good and the intelligent answers by the children give evidence of good instruction by the teacher.

These competitions are doing much to instill into the minds of the rising generation the importance of conservation.

(d) *Windbreak Plantings*

Mr. Albert Jackman has done much towards this type of activity. He has offered prizes in both rural school ground improvement and the windbreak contests in Grey and Bruce Counties. With the local Forester it has

been possible to inspect the windbreaks, and the winning entry in 1949 was outstanding, for which the competitor received a cash prize of $50.00.

These competitions are producing good results, and after having observed the work, heard favourable comments, seen the interest of those participating, we urge Societies in other sections to organize such competitions, so that no ground may be lost. We owe considerable to those giving leadership by offering prizes, etc.

Public Planting

This has always been deemed a most important part of Society programme. Such work gives concrete evidence that the organization has the good of the community at heart, and that public funds are expended in the proper manner. It is most gratifying when visiting various communities to have parks, plots, public buildings, memorials, halls and schools pointed out as being planted by the local Horticultural Society.

Many plots have been replanted since the war, and improvements have added to the general beauty already existing. It is safe to say that members of this Association have planted more than any other organization in Ontario.

How to Kill a Society

Some of what follows may not be pleasant, but we except the doctor to examine our ailments and recommend a cure. It is wisdom to look inward for possible handicaps, so the following is not presented in a critical manner nor as fault-finding, but rather that we might see where we erred or failed. We are told to reprove our friends in secret, praise them openly.

Of 127 Society Statements Examined—

60 show a decrease in membership. WHY?

33 did NO public planting of any kind.

36 held NO flower show.

77 did NOT have a garden competition.

60 did NOT hold any competition for juniors.

118 did NOT sponsor a Wild Flower Essay Competition.

30 Societies stated they held no SHOW, no GARDEN COMPETITION, and did no PUBLIC PLANTING. Do such Societies deserve public support? We must justify our existence.

64 Societies did NOT attend District meetings. Was this lack of interest, failure to co-operate, or just COULD NOT BE BOTHERED? If such meetings are worth holding, then they are worth attending.

10 Societies did NOT hold a single meeting for Officers and Directors; 13 held only one such meeting, and 16 held two meetings. Might we ask when the business of such Societies was transacted, accounts approved for payment, and programme prepared, IF ANY?

36 held two Society meetings during 1949.

54 Societies held only ONE meeting. This is rather alarming as it indicates that a quarter of the Societies forming this Association met but once, possibly the annual meeting, and then forgot the matter of Society business for a year. Is it any wonder that citizens ask "Why join the Society?"

Meetings

In many cases they are never advertised through card, press, poster or the medium of the children.

Meetings are late in starting and impatient citizens wait until eight-thirty or a quarter to nine before the speaker of the evening is called on. The result is the meeting drags on to 10.30 p.m. or later. Many leave declaring they will not go back. START ON TIME.

Guest speakers complain at being called on after a long business session. Remember, these men may have a 50-mile drive after they finish, whereas the members have just to go round the corner to their homes.

Often meetings are poorly conducted. On one occasion a secretary jumped to his feet, stood in front of the President, called for a motion which was put to the meeting, while members were talking all through the audience. Imagine the effect this would have on strangers, and possible members.

Every member is entitled to receive notice and attend the annual meeting, so that he may know the state of finances and how money was spent. He should also share in election of officers. Cases exist where the membership is not notified and the business of the Society is transacted by a limited few. This is dangerous practice, because any member may complain to the Superintendent and upset the entire proceedings. Then the whole affair would have to be done over again, according to the Horticultural Societies Act.

Membership

On one occasion a secretary was asked how the membership was secured. The reply was very interesting: "Our municipality gives a grant of $175.00, so we just pick 175 ratepayers' names." Such could not be considered regular members of that Society. It was pointed out this was not only contrary to the Act, but if each had paid an annual fee to the

S.S. No. 12, Haldimand Twp., Northumberland County, School Tree Plantation. Winner of first prize, Provincial Forestry Competition, 1945.

Society, with the grant, there would have been $350.00 to work with instead of $175.00.

The best way to secure members is by personal contact. Do not endeavour to buy members with premiums or options. The Society is a Service Club and most fair-minded citizens will join a good cause if it operates for the good of all.

Use of Funds

Societies are receiving Government and Municipal grants, also donations, and such should be considered more or less public funds, in trust. There are many criticisms that such money is used selfishly for prize money and premiums, with the result that grants are lost to some Societies because public planting is overlooked.

Imagine a Society with a substantial balance in the treasury, but holding no flower show, no garden competitions, doing no juvenile work, no encouragement to essay or school competitions, and no public planting, but satisfied to hold a banquet and drop $100.00 in the effort. Can such a Society expect to hold the respect of the community?

These are all weak spots that require examination by those concerned. There is evidence that there may be lack of interest on the part of the Board of Directors; indifference of members; lack of opportunity; or just WE DON'T CARE.

Snap Shots

1. Don't attend meetings, but if you do, arrive late and leave before the meeting is closed.
2. Talk in a loud whisper during the address—it helps the guest speaker.
3. Never compliment the speaker, you know more about the topic than he does.
4. When at the meeting vote to do everything, then go home and forget it.
5. Get all the organization can give you, but give nothing in return. Kick if you don't get your share or a free ticket.
6. Talk co-operation, but never co-operate; just say you haven't the time.
7. Accept any office, but do not act, your name looks good in print.
8. Find fault with the President, cuss the Secretary, criticise the Board of Directors, and tell everyone the Society is run by a clique.
9. Never take office, it makes it easier to criticise those who do. If you are not nominated, it is always the other fellow's fault.
10. Never offer suggestions, wait until on the way home and air your views. Your opinions are always the best.
11. Don't join the Society until the day of the show; you might not have flowers to exhibit, so why join if there is no prize money in view.
12. Keep your eye open for something wrong, when you find it resign. Be sure you get your way, even though it is wrong.

SOILS AND FERTILIZERS IN GARDENING

R. Goodwin-Wilson, *Ontario Agricultural College, Guelph.*

THE primary factor in the building of productive garden soil is one of good physical condition, because without good physical condition no amount of fertilizer will have the desired effect on plant growth. Good physical condition means excellent drainage, aeration, and a high organic matter content.

The Problems in Order of Their Importance Are:

1. Physical Condition—
   - (a) Aeration,
   - (b) Drainage, particularly underdrainage,
   - (c) Water-holding capacity.
2. Organic Matter—

   Continued cultivation tends toward rapid oxidation or "burning out" of organic matter.

   Organic matter is one of the most important factors in improving the physical condition of soil.
   - (a) Action on heavy soils—
     - (1) Aeration,
     - (2) Humus action on clay particles—granulation.
   - (b) Action on light soils—
     - (1) Adds body and colloidal matter.
   - (c) Function of organic matter—
     - (1) Contributes to weathering processes,
     - (2) Improves water-holding capacity,
     - (3) Acts as a storehouse of various chemical elements—particularly nitrogen,
     - (4) Encourages the growth of beneficial micro-organisms.
   - (d) Sources of organic matter—
     - (1) Barnyard manure (½ ton per 1,000 cu. ft.),
     - (2) Compost (acto),
     - (3) Artificial manure—

       Ammonium sulphate, 45 parts; superphosphate, 15 parts; lime, 40 parts; added at rate of 150 lbs. per ton of straw,
     - (4) Peat,
     - (5) Strawy material, such as straw, hay, shavings—add cyanamid at ½ lb. per 100 sq. ft.
3. Adequate phosporus levels—5 to 6 lbs. superphosphate or bone meal per 100 sq. ft. as a basic treatment.
4. Controlled Nutrition.
5. Garden Fertilizers—
   - (a) Sandy loam soils: 4-12-10 at the rate of ¾ lb. per 100 sq. ft. additional nitrogen as side dressing as required.
   - (b) Clay loam: 2-12-10 or 2-12-16 at the rate of ¾ lb. per 100 sq. ft. additional nitrogen as side dressing as required.

SMALL BULBS OF DISTINCTION

C. A. CRUICKSHANK, *Toronto.*

PERHAPS this title should be clarified. First of all the field is so vast that I intend to confine my remarks to Spring-blooming hardy bulbs for Fall planting. Secondly, bulbs of distinction does not necessarily refer to new introductions but small bulbs old and new which seem to have been overlooked by many amateurs.

Those who travel the highways know that the most interesting scenery is often found on unfrequented side roads. So it is with plants. Many who keep on growing only the better known varieties or types in any family of plants, without exploring the possibilities of the more uncommon varieties, are missing a great deal.

Everyone is familiar with the large flowering Crocus, the ordinary Scilla Siberica and Muscari or Grape Hyacinths. From there on knowledge of the small bulbs tapers off and many delightful little species are apparently known only to a few enthusiasts. The fact that such bulbs are often given scant attention in many garden books and catalogues, being simply lumped together as "miscellaneous bulbs", may contribute to this neglect. If I can arouse a little enthusiasm for these garden cinderellas I shall feel amply repaid, for they have given so much pleasure that I would like to pass it on.

These small bulbs may be used in countless ways. Most are ideal rockery subjects, all are charming in groups or drifts throughout the hardy border, or used in corners and pockets anywhere. Some may be naturalized in woodlands, others are ideal for pot culture to brighten winter windows.

The tulip species or so-called "botanical tulips" are one of the most interesting groups, as they present such variation in form, colour and size. While most of the species are small in size a few are very large. The sensational Red Emperor, possibly the largest tulip in existence and simply a selected form of the species Fosteriana, has been the cause of an increased interest in other species. Quite often I receive an excited enquiry concerning tulips that are seen in bloom early in April, long before respectable tulips are even showing up. If not Red Emperor these will very likely prove to be T. Kaufmaniana or one of its many selections or hybrids. The type, or in other words, the original T. Kaufmaniana is creamy white with a yellow base and the exterior of the three outer petals flushed with pink. Many new varieties have variations on this colour scheme and some, such as Scarlet Elegance, are all red. Other very good ones are Gaiety, a creamy white form; Vivaldi, creamy yellow with bright red outer petals, and Shakespeare, which could be called "Strawberries and Cream" as it is a striking mixture of bright pink, orange, salmon and white. There are scores of others, and once one becomes addicted to these tulips there is scarcely any cure. The height varies from 5 to 12 inches, and many of the hybrids have mottled leaves, reminding one of our Canadian Dog's Tooth Violet. The blooms open out almost flat in the early Spring sunshine, hence the common name of "Water Lily Tulips".

Another fine species is T. Tarda, to many enthusiasts one of the loveliest, producing quantities of bright yellow flowers with white tips no larger than a 25-cent piece, and often 4 or 5 to one stem. Tarda is so dwarf it fairly hugs the ground, and with its narrow, glossy foliage is so unlike its more imposing large-flowered relatives that sometimes garden

visitors need some persuasion to be convinced that it is a tulip at all. Like many of the species, it is more persistent than ordinary tulips and will keep on for many years without disturbing. It is also quite inexpensive, surely a combination that should arouse a lively desire for possession.

Several Varieties

Praestans, 10 inches in height, is another fine species, that comes in a most unusual shade of red, almost a vermilion or tomato colour that is not duplicated to my knowledge in any of the large tulips. Even the base is the same colour, and the leaves are slightly fuzzy or woolly. There are several varieties in this species, varying in size and shade. Fusilier is one of the best of these.

T. Clusiana, often called the "Lady Tulip" for some obscure reason, will run up to a foot in height, though the flowers are small. It is white, with a crimson exterior, and is a species that is fairly well-known.

T. Batalini and T. Linifolia are two species that do very well together as both have the same habit of growth, long narrow undulated leaves with a thin red margin, the apparent difference being chiefly in the colour of the bloom. T. Batalini is a soft primrose yellow, an uncommon shade in tulip species. In fact, a hybrid between the two, known as T. Batalini Bronze Charm, is a valuable addition to the group.

T. Schrenhi is one of the rarer species, unique in its colouring, a vivid red with yellow tips. It seems to last longer in bloom than most.

T. Kolpakowasky is yellow with scarlet blotches, and despite its unwieldy name is a most desirable species. T. Sylvestris is an excellent golden yellow species though at times inclined to be shy blooming, but the Tabriz variety of T. Sylvestris is an improvement in this respect.

The bulbs of the species tulips present almost as wide a variation as the blooms. Some are almost as tiny as snow drop bulbs; others are easily as large as ordinary tulips. Many, like T. Clausiana, are lined with soft fleece, and some, like the golden brown bulbs of T. Tarda or the reddish bulbs of T. Sylvestris, look almost good enough to eat.

Do not make the mistake of planting tulip species too shallow. Despite their small size they are generally planted as deep or even deeper than ordinary tulips. Even 10 inches deep is usually satisfactory, and I find that rather late planting, late October or early November, is best.

The Narcissus or Daffodil family includes some enchanting small species, though unfortunately a few are not reliably hardy in Ontario. The smaller trumpet daffodils are graduated all the way from W. P. Milver, about half the size of an ordinary daffodil to names, Loburlaris, Minor and Minimus, the baby of the lot, so tiny as to be unbelievable until you have grown it. The whole plant is not over 3″ tall and the small, perfectly proportioned flowers are no larger than a ten-cent piece. Minimus is so very small that Minor is probably the smallest variety suitable for garden display, though Minimus is a desirable novelty. There are several small members of the Jonquil group well worth attention, and one of the loveliest is the Baby Jonquil or N. Juncifolius. This bears clusters of rich butter yellow flowers and is intensely fragrant. Not the least of its virtues is the fact that it is one of the latest of Narcissus to bloom, sometimes as late as the Darwin tulips, thus prolonging the season. The height is only 4 inches and the flowers only ¾″ in diameter.

All these are perfectly hardy, but I am tempted to add N. Triandrus Albus, or "Angel's Tears Daffodil", a poetic name which is well deserved, for it is the personification of daintiness. While rather tender, I suggest that a few in a sheltered spot as an experiment is well worth while, and in any case you can enjoy its beauty as a subject for pot culture. The small, nodding, creamy-white flowers with reflexing perianth are borne several to a stem.

Crocus

Crocus are one of the best loved flowers of early Spring and so low in price that they give more for the dollar than most other bulbs. In the large flowered or so-called Dutch Crocus Vanguard is an attractive newcomer, and as its name implies, it is first on the scene, thus blooming with the yellow crocus. The colour is a light ageratum blue, the three outer petals shading to grey.

But it is in the species where the adventurous gardener will find much to arouse his interest. In general the species bloom a week or two before other crocus, and the flowers are half the size or less, but there are a lot of them. One of the loveliest is C. Biflorus, a rich yellow with bronze exterior. Others that can be highly recommended are C. Sieberi, a large light blue with a golden throat; Balansal, a deep orange; Imperati, striped white and purple, and the Chrysanthus group, all of which are exceptionally fine—Snow Bunting and white with golden throat and Zwanenburg Bronze are two excellent examples. There are scores of other miniature species, but the time at our disposal does not permit descriptions. As with other small bulbs it should not be necessary to emphasize that the best effect is gained from a mass effect. Therefore plant in groups of at least a dozen bulbs of a variety.

One of the most neglected group of small bulbs are the Iris, and this does not mean Irish Pumila, which is simply a dwarf form of the tall bearded. The bulbous Iris are something else again. The best-known species but still all too seldom seen is Iris Reticulata, the "violet-scented Iris". This is almost the same colour as the violet and has the same fragrance; I consider this as one of the most pleasing of all the small bulbs. The bulbs remind one of a small nutmeg in appearance, and Reticulata blooms so early that it is a race with the Snowdrops as to which shall be first. The curious, narrow leaves terminate in a white spine. There are a number of hybrids equally attractive except that they have lost most of the fragrance of the type. Some of the best of these are Cantab, a pale blue; J. S. Dijt, reddish purple, and the new Royal Blue, an exceedingly beautiful variety and much larger than the others. Little groups of these Reticulatas will prove to be cherished possession in the early garden, and if in a happy spot, which means a coarse sandy loam in full sun, will increase and multiply for many years. Iris are generally rather fleeting, but in cool weather I have known Iris Reticulata blooms to last for fully ten days.

Similar to Irish Reticulata is Iris Danfordiae, a bright golden yellow, a colour which does not exist in true Reticulatas. It is altogether lovely though it must be admitted that it is not quite so reliable and hardy as Reticulata.

That section of the Iris family known as the Juno Irises can produce some pleasant surprises. The plants are very un-Iris like in appearance, looking very much like a miniature coin plant, the flowers appearing in the

axils of the leaves, which are light green and glossy. Three excellent examples which can be recommended are Iris Bucharica, white and yellow and fragrant; Iris Vicaris, very pale blue, and Iris Graeberiana, light blue. The bulbs of this group are almost as large as Tulip bulbs, and come with thick, fleshy roots. These roots are brittle but as many as possible should be preserved when planting. Then there are the Dutch, English and Spanish Iris, each represented by scores of varieties. As is well known, the Dutch Iris are used by the florists in large quantities, though they have considerable garden value as well.

Chionodaxas or Glory of the Snow provide us with some of the most interesting small bulbs blooming at the same time as Scilla Siberica. Two of the best are C. Luciliae, blue with white eye, the best known variety, and C. Gigantea or Alleni, a large pale blue. There are pure white forms of both species. There is also a deep blue in C. Sardensis though the flowers family of interesting varieties. To start with, the improved Scilla Siberica, pale and one could wish that they were several shades deeper.

The earliest of all the small bulbs to bloom are the Eranthis or "Winter Acouite", which will burst into bloom on the slightest promise of Spring weather, often through the snow in March. The small globular buds, surrounded by a collar of finely-cut green foliage open into bright golden yellow flowers. There are only a few varieties and the best is E. Tubergeni, which is double the size of the other species. Eranthis are an interesting novelty rather than a subject for garden decoration, as they bloom while the rest of the garden is still asleep. Nevertheless a little colony of them is a cheering sight. An important point to remember is that the rather odd black tubers must be planted early as they dry out quickly.

Whole Family

To most people Scillas are just the little blue flowers of early Spring which are planted so freely and then let it go at that. But there is a whole family of interesting varieties. To start with, the improved Scilla Sibirica, Spring Beauty is far more robust and imposing than the type. Then there is Scilla Siberica Alba, the pure white form, and Scilla Siberica Taurica, earlier and ever a brighter blue than the type, though smaller. But a new species is S. Tubergeniana, discovered in Northern Persia a few years ago and now out of the expensive class. The colour is an exquisite very pale blue and it produces an amazing number of blooms. Also the individual flowers tend to face outwards and not downwards like S. Siberica. Scilla Amethystina is another interesting novelty and quite unlike other Scillas in appearance. It does not bloom until the end of May and the spikes of clear blue are conical in shape and about six inches tall. This species hails from Dalmatia.

In passing mention should be made of S. Nutans, an English Wood Hyacinth or Bluebell, and its close relative, S. Campanulata or Spanish Squill. These are quite unlike other Scillas and are late blooming—about the end of May. They require some shade and are useful for woodland planting, but not too hardy in most sections of Ontario.

There is plenty of opportunity to discover something unusual and interesting in Muscari or Grape Hyacinths apart from the commonly grown Heavenly Blue or the newer M. Armeniacum, which is much better. Muscari Latifolium is a real gem. The top of the spike is bright blue and the lower bells are dark blue, with broad leaves, unlike the narrow leaves of

most species. A still better species in the same colour scheme is the newly discovered Tubergenianum, sometimes called the "Oxford and Cambridge" Muscari. Then there is the much smaller and very early M. Azureum, a cheerful shade of bright blue, and its pure white form, M. Azureum Album. All of these will help to arouse interest in a very desirable group of bulbs. Muscari are low in price and multiply rapidly, so that they are an excellent investment.

An interesting bulb still not very well known is Fritillaria Meleagris, variously known as the "Snakeshead Fritillary", "Guinea Hen Flower" and "Mission Bells". In addition to white the colours cover quite a range of reddish purple, pinkish lavenders and deep violet. While not spectacular as to colour they are nevertheless most intriguing. All have a peculiar chequering and their nodding bells on wiry stems a foot tall with no foliage to speak of, are really attractive. Plant early as the bulbs do not keep well into late Fall.

No discussion of small bulbs would be complete without mention of Hyacinthus Amethystinus or the "Alpine Hyacinth", dainty Hyacinth-like bells on six-inch stems. Reginald Farrer, the famous plant collector, considered it one of the finest of all small bulbs. It really is a charming little bulb. The foliage appears very early, but this is a false alarm. Towards the end of May, when one is about ready to discard the bulbs entirely as quite worthless, the flower spikes finally appear. It should be planted in sizeable groups for best effects. There are both blue and white forms.

Ixiolirions are represented by two similar species. Ixia Pallasi is the best one. Even the name is little known, but Ixiolirions are usually treasured possessions once they are grown. The flowers are somewhat tubular in shape, coming in large clusters on stiff stems a foot or so in height. This is about the last of the Spring blooming bulbs to bloom, often not until early June.

This represents by no means a complete list of interesting small bulbs. There are Puschikinia Alliums, Cyclamen, Oxalis and a host of others, the adventurous gardener will discover virgin territory that has hardly been touched. But at least this should whet the appetite for a corner in the garden where a few of these delightful bulbs can be given an opportunity to demonstrate how much they can add to garden pleasure. Almost all are ruggedly hardy, easy to grow and inexpensive.

A word about pot culture. Tulip species are not generally considered suitable for pot culture, but Tulips Kaufmanniana is an exception, both the species and the hybrids. Tulips Clusiana can also be induced to give satisfactory results. All the small Narcissus, Crocus, Chionodoxa and Scillas do very well potted.

THE MEMORIAL PERIOD

By MRS. D. A. GILLIES, *Arnprior.*

MR. JAMES BURNS SPENCER passed away at his home in Ottawa, in his 85th year, on January 11th, 1950. Son of the late Herbert H. Spencer and his wife, the late Agnes Burns, he was born at Brooklin, Ontario, in 1866. He graduated from the Ontario Agricultural College in 1894. After spending some years in editing various agricultural journals, including the Family Herald and Weekly Star, he entered the Dominion Department of Agriculture. Later in 1914 he was made director of the Publications Branch, and retained this position until his retirement from the service in 1935.

Mr. Spencer was one of the pioneer members of the Society of Technical Agriculturists, later known as the Agricultural Institute. He was a charter member of the editors' group of Professional Institute of Civil Service. He was active also in the Press Club of Ottawa.

Besides being the author of many departmental bulletins, he wrote numerous articles on horticulture which have been widely published. He served with distinction as Director and later President of the Ontario Horticultural Association.

He was the father of the idea of choosing the white trillium as the floral emblem of Ontario, and was made very happy to see this adopted by Act of Parliament.

His outstanding ability and wide experience received recognition in his appointment to the position of honour as member of the Federal District Commission, which high office he held until his death.

This Federal District Commission has full charge of the laying-out, co-ordinating, landscaping and maintaining all the beautiful public grounds, parks and driveways, not only in and around the capital city of Ottawa, but comprises the city of Hull, and thousands of acres in the Gatineau district. This plan, which Mr. J. B. Spencer helped to formulate, is a long-term project extending many years into the future, and required judgment and vision of a high order.

This is but a brief factual record of his accomplishments and honours but it fails to convey the real achievement of his life. His was a gentle, modest, unassuming, lovable character; kindly approachable, he was willing at all times to give of himself, his experience, and high talents for the furtherance of any good cause for the cultural improvement of Canada.

Among his interests horticulture held a high place, and we of the horticultural fraternity of the Ottawa Valley had an unique opportunity to know and appreciate his many sterling qualities of mind and understanding heart. Never were the problems of the smallest Society too unimportant for him to give to it his sympathy and whole-hearted attention.

His was a beautiful character, emblematic of the best of the gardening fellowship. He will be always missed by the many who enjoyed his warm friendship and wise counsel. This memory of his character and fine record is a heritage and an inspiration to all throughout the years to come. He was a builder of tradition.

ROSES

J. C. TAYLOR, *Ontario Agricultural College, Guelph.*

Soil—Must be well drained. Prepare by digging in manure in the Autumn. Prior to planting apply a complete fertilizer according to needs of soil.

Planting—Plant in Fall or early Spring. Protect roots from sun and wind. The swollen area on the stem, just above the roots, should be set about one inch below the surface of the ground. Cut back the tops to four or five inches from ground level.

Fertilizer—Light application of complete fertilizer during early May, early June and early July.

Mulching—Keeps down weeds and prevents evaporation of moisture from the soil. Strawy manure suitable but untidy. Peat also suitable and much better in appearance.

Spraying—In Spring, *before buds leaf out,* spray with lime sulphur at strength of 1 part by measure to 10 parts of water. Keep spray away from wood and stonework. After leaves appear weekly applications of one or other of the rose sprays or rose dusts will control most diseases and insects.

Pruning—Hybrid Teas: In Spring, before growth starts, cut back all dead wood and also very weak, twiggy growth. The remaining growths should be shortened according to their growth, to give a uniform appearance and balance to the plant. Prune lightly. Hardy climbers are pruned after flowering by cutting out growths which have flowered. Train in young growths to replace them.

Suckers—Sucker growths from root stocks must be pulled out as soon as observed. Cutting them at ground level only makes them branch out.

Watering—Water to keep soil uniformly moist but not saturated.

REPORT OF CONSERVATION AND REFORESTATION COMMITTEE

YOUR Conservation and Reforestation Committee submits our sixth report. Great interest has developed in conservation in all its branches. Seven years ago very little interest was taken, today the great majority of our people are conservation minded. The press, radio and conservation speakers have done much to enlighten our people. Shortage of water in cities, towns and on farms, regulations and restrictions in the use of hydro and lower crops last year have brought home to our people that something is wrong. They are now receptive to news as to cause and remedy. This is the best evidence that they realize something must be done to preserve the present standard of living.

During the past six years your committee has done a lot of pioneering work together with other county organizations in educating our citizens to the necessity for strong conservation policy. The Ontario Horticultural Association competitions, such as the Rural School Improvement, Rural School Forestry, Save the Wild Flower, and Mr. A. J. Jackman's competition in Bruce and Grey in the Windbreak competition, also the Committee's co-operation in securing the passage of the Tree Cutting Act, our briefs to the Royal Commission on Forestry, and brief to the Select Committee on Conservation, have had far-reaching effect.

A major step in conservation was made last year, when the Legislature appointed a fact-finding committee of the Legislature. The membership of the committee consists of representatives of the three political parties in the House. This is certainly a healthy sign and no doubt the report of this committee will be presented during the present session of the Legislature and will demonstrate that all parties are concerned about present conditions in Ontario, and to present a province-wide policy on conservation probably to be followed by a Conservation Act.

Conservation—Waste Land—Norfolk County.

Your committee will anxiously await the Select Committee's report. We hope all Horticultural Societies will study it so that this Association will do its part in the great work of conservation as outlined by the Government's policy.

Tree Cutting

Your committee is pleased that the majority of our counties have passed tree-cutting by-laws. Horticultural Societies in counties that have not passed a by-law should endeavour to have the County Council do so.

Your committee is very much disappointed with the entries in the "Save the Wild Flower Competition". This organization has 172 Societies receiving grants—only 18 Societies had entries in this competition. For many years resolutions were passed by our convention regarding the destruction of wild flowers. It was decided by the convention four years ago to hold a Wild Flower Essay Competition. Mr. Carroll prepared the rules and regulations, which were supplied to the delegates, the judging to be done by this committee. Past President Mrs. D. A. Gillies, Mr. Lane, and the O.H.A. furnished valuable prizes. What was the result—only 18 Societies saw fit to have an entry in the competition. We ask that every delegate get from Mr. Carroll the sheet giving the rules governing this competition, take it back to your Society and see that they have an entry in 1950. This committee expects at least 100 entries this year. Resolutions will not suffice—action is what counts. The thanks of the committee are tendered to Mrs. Gillies, and the O.H.A. for the splendid prizes.

Same Land—Red Pine Twelve Years After Planting.

This committee recommends that wherever possible farm ponds be made, to retain all the water possible.

The thanks of this committee is extended to Mr. John F. Clark for his valuable work in connection with the Rural School Improvement and the Rural School Forestry Competitions, to Mr. A. J. Jackman, District Director of No. 8, for his valuable work and trophy for the Windbreak Competition in the Counties of Grey and Bruce.

The Kingston Society is continuing its fine work on the large tract at Barriefield, which is now a Crown Game Preserve.

The first Rural School Forestry Competition was held in Zone 6 in 1949, and made a fine showing. We welcome Zone 6, and under the capable direction of Mr. A. E. Walroth, Zone Forester, and Mr. W. E. Steele, District Director, we are satisfied that they will do a fine job in District 6.

This committee would welcome the co-operation of all District Directors in promoting the Rural School Forestry, the Wild Flower, and the Rural School Improvement Competitions. Ontario covers a lot of territory and their co-operation will be appreciated.

Mr. A. H. Richardson, Chief Engineer of the Planning and Development Department, has completed the survey of the Nith River. We hope work on same will be commenced this year.

Mr. Watson H. Porter, a member of this committee, and editor of the Farmer's Advocate, has done a fine job in conservation publicity, and is one of Ontario's outstanding men in that work.

School Section No. 12, Haldimand, Northumberland County, has again won first prize in the Provincial Rural School Forestry Competition. This is the third time this school has won first prize. The teacher, Mrs. I. B. Nelson, and her pupils are doing good work. Their school forest now consists of two acres of fine young growth.

Mr. A. A. Martin, School Inspector of Northumberland, is doing a wonderful job in his district, which has won many honours in the competitions.

Mrs. D. A. Gillies, Arnprior, and Mrs. Albert Scharf, Kars, have represented the O.H.A. Conservation and Co-ordinating Committee in Eastern Ontario, and are doing fine work.

Mr. W. E. Steele, District Forester, Kemptville, suggests that a good subject for Horticultural Societies' members, and local study groups, could be formed to study the Royal Commission on Forestry's report, and the forthcoming report of the Select Committee of the House, as this is a vital subject to all.

Mrs. A. B. Samells is doing splendid work in Bruce County for our committee, and we all appreciate her work.

Our thanks are given to the Inter-Departmental Committee for the splendid service they have rendered in the operation of our Provincial Competitions.

The District and Zone Foresters are a fine body of men. Why not consult them when you have any problems regarding planting of trees in that reforesting project that should be done on your farm.

All of which is respectfully submitted,

J. E. CARTER (*Chairman*), Guelph.

Members of the Conservation Committee are as follows:

C. A. BYAM, New Liskeard	WATSON H. PORTER, London
MRS. A. B. SAMELLS, Wiarton	HUGH TEMPLIN, Fergus
A. H. RICHARDSON, Toronto	I. C. MARRITT, Galt
A. A. MARTIN, Brighton	W. E. STEELE, Kemptville
MRS. D. W. BOUCHER, Kingston	W. R. SMITH, London
MRS. D. A. GILLIES, Arnprior	J. A. CARROLL, Sec., Toronto

TALL BEARDED IRIS

C. E. LITTLE, *Richmond Hill.*

FROM northern Africa, the southern slopes of Europe and Asia Minor came the forebearers of our present race of tall-bearded iris. This Mediterranean area was also the cradle of our present civilization, and it would appear that the "Flure-de-Luce", meaning "Flower of Light", described by John Gerrard, the sixteenth century English herbalist and surgeon, has had a high place in the thoughts of man since the earliest times.

In Greek mythology it seems to have been associated with the Trident, the symbol of the "Fire of the Gods". The Goddess Iris was the messenger of the ancient gods and the rainbow was her symbol. It was they who first gave fire and light to mankind, so it is small wonder that when man saw the brilliantly coloured flower shaped so like the Trident, he regarded it as a symbol of supreme good and gave to it the name of the goddess who came from Heaven to earth by way of the rainbow.

Throughout the ages the iris has been prominent in art and heraldry. "The Flower of Chivalry", Louis VII chose it as his badge and today the Fluer-de-Lis is the national flower of France. The Mohammedans were accustomed to plant it on the graves of their dead and carried it on their wanderings, the large, fleshy roots were able to sustain the spark of life for considerable periods of time. This aided greatly in its distribution, as it does today, making possible shipments to all parts of the world.

In Italy entire hillsides were covered with iris; the roots provided the Orris root of commerce. In the latter part of the eighteenth century an English physician, Sir Michael Foster, undertook the first real breeding programme, and some years later, after Sir Michael's death, W. R. Dykes, also of England, while carrying on the breeding compiled and published probably the finest work on this flower, "The Genus Iris". On the fine foundation laid by these men, and others of their time, a very intensive programme of breeding has continued until today. The check list of the American Iris Society contains the record of well over twenty thousand named varieties embracing every colour of the rainbow in an endless array of shades and blends.

"All Time Great"

It is good to know that our Canadian hybridizers have produced some of the finest. Great Lakes, a lovely blue from Mr. Cousins of London, Ontario, is an "all time great"! Wm. Miles of Ingersoll has given us some very fine things, but probably his best are two fine blues, Vanda and Elizabeth of England. When introduced this past season in England, they re-

ceived most glowing praise. Mr. Chas. Bauckham's brilliant coffee-coloured Toranda has won praise both in England and the U.S.A. It is not generally known that the acknowledged leader in the breeding of the new pink iris, Mr. David Hall, is also a Canadian. His grandfather, on coming to Canada, settled first in Richmond Hill, moving later to Essex County, where Mr. Hall was born.

The culture of the tall bearded iris is quite easy. It will grow in any average garden soil, provided the drainage is good, and it is planted in full sun. For best results, however, the soil should be neutral or slightly acid; it should contain a fair amount of potash, plenty of phosphorus but rather low in nitrogen. Have soil tested and add what is needed. Lime or bonemeal should never be used unless the soil is strongly acid, a condition rarely found in this locality.

If a soil is either strongly alkaline or acid, the plant cannot obtain food, as the millions of bacteria in the soil find this condition unfavourable and cease their work of changing the various ingredients into forms that can be used by the plants. They also require plenty of humus and an open friable soil. In fact, the real secret of gardening is keeping these little fellows happy. Do that, and your gardening troubles are over.

In planting, leave a mound in the centre of the hole and place the fleshy part of the root firmly on top of this, with the feeding roots well down so that they will anchor the plant when the hole is filled, and the earth well firmed. The top of the rhizome should be about one inch below the surface. Water well and repeat weekly in dry weather. In two to four years time, when the plant becomes crowded, lift and reset, separating completely.

For fine effect a large group is best. To obtain this plant six or eight rhizomes of the same variety about eight inches apart. Do not leave four or five rhizomes together, as they grow on the old plant, and expect to have good results. When irises are used in the perennial border, they should not be crowded or planted where other plants will shade them. Heights and colours are available for any position or colour scheme.

The flower buds for next year's display are formed during August, September and October, so it would appear that the best time to transplant iris would be July, shortly after flowering. Planting then also gives the plant time to establish itself before Winter. The iris can, however, be moved at almost any time that the ground can be dug.

Diseases Few

Diseases and pests are few. Leaf spot is unsightly, but rarely fatal, and is easily controlled by dusting or spraying with Bordeaux mixture or sulphur. Soft rot is more serious but is usually caused by wet ground, lack of sunshine or stable manure not applied early enough and not properly worked in before planting. The only remedy is to dig the plant, cut away the diseased portion, dip in a ruby-red solution of permanganate of potash, let dry in the sun, and replant in a new location. A good preventative measure if the ground is heavy and wet is to scrape away the earth from the top of the rhizome and expose it to the sun.

The borer is sometimes troublesome. The moth lays her eggs on the dead iris leaves or nearby plants in late Fall; these hatch in early Spring,

and the small borer enters the leaves and starts eating his way down to the root. The remedy is to clean up all dead leaves in the Fall and spray with DDT every ten days through May and early June.

As we stated earlier, there are well over twenty thousand named varieties; however, two or three hundred cover the best of those that are now in commerce. Listed here are a few in each colour class that can be depended upon to give complete satisfaction. The prices range from twenty-five cents to twenty-five dollars—a colour and price to suit the most exacting:

White—Gudrun, Matterhorn, Kathrine Fay, White City, Spring Romance.

Light Yellow—Elsa Sass, Golden Fleece, Fair Elaine.

Darker Yellow—Golden Hind, Golden Majesty, Berkley Gold, Ola Kala, Golden Ruffles.

Pale Blue—Gloriole, Cloud Castle, Great Lakes, Elizabeth of England.

Medium Blue—The Admiral, Blue Zenith, Blue Rythmn.

Purple (dark)—Deep Velvet, Nightfall, Sable, Vice-Regal.

Violet—Violet Crown, Violet Symphony, Mulberry Rose, Elmohr, Lord Dongan.

Reds—Christobel, The Red Douglas, Red Valor, Ranger.

Orchid Pink—China Maid, Aubanal, Melanie, Remembrance, Rosebowl.

Pinks (Tangerine Bearded)—Flora Zenor, Melitza, Spindrift, Cherie.

Orange Shades—Naranja, Prince of Orange, Arab Chief, Rocket.

Russett and Tan—Stardom, Fortune, Toranda, Casa Morene, Tobacco Road.

Plicata—Los Angeles, Tiffany, Tiffanja, Blue Shimmer.

Varigata—City of Lincoln, Persian Prince, Gypsy, Mary Vernon.

Amoena—Wabash, Amigo, Lothario.

This list could be varied almost endlessly, as there are many others that might well be included.

Nearly all the members of the Canadian Iris Society welcome visitors to their gardens at blooming time, around the middle of June. These are gardens where the newest and best, as well as the old favourites, may be seen. Gardens are located in Hamilton, Ingersoll, London, Toronto, Stratford, Ottawa, and Richmond Hill. Mr. Leslie Laking, Box 399, Hamilton, is the secretary of the Society, should you care for more information.

For a real treat I would suggest you visit one of these gardens. If you are not familiar with the recent developments in iris you have a pleasant surprise in store, and when you grow them you will find the iris gives excellent returns for the time and money spent.

EARLY PRUNING

W. E. FOSTER, *London.*

Trees

THERE are certain well-defined laws governing the life of trees. Through the study of the structure of a tree, we find it composed of several important parts, namely, the root system, bark, cambium sapwood, heartwood, trunk and branches. To avoid making mistakes it is important to have some general knowledge of a tree structure and manner of growth. Upon looking at the cross section of a tree trunk three concentric circles may be readily seen—the centre dark area is the heartwood, the lighter coloured circle lying immediately outside it is the sapwood, and the dark circle surrounding both is the bark. Between the bark and the sapwood lies a very thin and less defined layer. It is termed the cambium layer. It is this delicate layer of cambium which is the most important part of a tree. When the cambium dies, the tree dies. Thus each year a more or less distinct layer of wood and bark is added to the tree.

In the shaping and pruning of shade trees, one is governed by the same points as when selecting a tree for planting. A lawn tree may branch low or may be crooked and unsymmetrical. The very imperfections give it its character, and it requires little attention and is left to grow naturally. A street tree, on the other hand, must be straight, symmetrical, and its branches must begin at the height from the ground that will allow the public free use of the street. The work of pruning should begin at the top of the tree, continued in a downward direction, and completed at the bottom. It is easier to shape a tree by that method, and time is saved in cleaning the tree of the pruned limbs. All cuts should be nearly parallel to the axis of the trunk. How to make a cut to prevent splitting and to ensure the healing of the scar are the important points in the pruning of all trees.

One of the best methods of removing a heavy limb is by making an undercut about one-half of the way through, about ten or twelve inches from the shoulder. Then make the next cut on top a little beyond the other cut. Continue this until the limb drops. Make a third cut close to the shoulder and remove the stub. The immediate return of vigour and apparent new lease on life is due more to the pruning than anything else. The time it takes a pruning scar to heal depends on its size and the rapidity of growth of the tree. While the callous is overgrowing the scar outside of the centre, the end grain of the remaining stub is exposed to the weather. The wood dries and cracks, and although all precautions may have been taken to remove the limb close to the trunk, by the time the wound heals the decay may be carried deeply into the tree. It is necessary, therefore, to apply a dressing to the surface of the scar when a limb is removed that will, as far as possible, prevent the decay of the old wood until it is capped with new callous. The best way of preserving the condition o fthe exposed stub is by the application of tree wound dressing. This fills the pores of the wood, and when it sets becomes hard as enamel. The tree wound dressing acts as an antiseptic and prevents the formation by moisture and dust of a fertile spot for the entrance of fungus spores and insects, and should be continued until the surface is overgrown. One must remember that heavy pruning forces abnormal growth, the removal of terminal buds, or the tipping of branches will control tree growth far more effectively, but in every case correct pruning demands a flush cut.

Evergreens

The art of pruning evergreens is not an easy subject to explain, neither is it one on which all gardeners agree. During recent years evergreens have been used extensively in foundation plantings and other small areas around the grounds, and need for frequent pruning has, therefore, developed.

To paraphrase an old maxim we might say "Spare the knife and spoil the tree", but we must not take this literally. Many plantings have been ruined by someone with a mania for trimming. Every tree, regardless of its natural habit, has been trimmed after the same pattern. This creates an artificial and monotonous appearance and ruins the beauty of the tree as nature intended it to grow. In contrast to this type we see plantings which have been entirely neglected. These sometimes become irregular, weak and thinned in appearance, and if allowed to go without attention soon fail to fill the place in the planting for which they were intended. Between these two extremes there is a reasonable middle course. Rules for pruning evergreens are dangerous unless tempered with the judgment of he who is doing the pruning. Each plant has individual characteristics—some are by nature conical, some columnar, some globular, and some prostrate. Suggestions cannot therefore be definite iron-clad rules to be followed without variations.

Let us first consider the purpose of pruning. We prune for any of several reasons:

To keep the tree within certain limits of size,

To remove any diseased or injured part of the tree,

To shape the tree into some special form,

To invigorate a weak tree.

Evergreens which grow with a single main stem or trunk are sometimes injured through breaking the top or leader. This damage is more apt to be found among spruce, fir, pine and trees which make a stiff straight stem. First select one of the side branches near the top of the tree which can easily be trained upward to start a new leader. This side branch must be tied in place and fastened to a wooden stake with cord. After a year or two in this position the defect in the appearance of the tree is scarcely noticeable. The pruning of mugho pines might well deserve a special explanation. In order to maintain trees in a compact growth the pruning should be done annually in late May or early June, depending, according to locality, upon when the buds have reached their greatest maturity before opening into leaves. Normally each branch will make a shoot of candle-like growth of two inches to five or six inches long. Two-thirds or more of this growth should be cut off with a knife or pruning shears. Mugho pines which are neglected will grow with a loose habit.

Evergreen hedges can be pruned at once after planting, but the first trimming should not be too severe. Remove any straggling or irregular branches and bring the individual tree into nearly the same size. The permanent shaping of the hedge will require a watchful eye and a careful hand. Dwarf Japanese evergreens can be had with some measure of success by pruning the roots of a seedling as heavily as the plant will endure and still look healthy. Each time the plant is repotted the roots should be pruned severely. The effect will be a stunting of the growth which will be

aided by lightly cutting back the top of the branches. In the Orient youthful dwarfs are made to assume the appearance of great age by covering the tree with syrup and allowing the ant to attack. They not only eat the syrup but devour part of the sweetened bark, giving the plant an aged and beaten appearance.

Shrubs

The general appearance and well-being of shrubs depend on the manner in which pruning is practised. Everyone knows that pruning is necessary, but many do not understand the principles which govern the use of pruning shears. Too often the natural form is marred by a general trimming instead of judicious thinning out of wood sufficient to keep up renewal of vigorous young growth. Except where desirable for architectural effects, sheared specimens give a spotty and unnatural appearance. Study the habit of the individual shrub before beginning any pruning operations. In general, shrubs which flower before midsummer should receive most of their pruning immediately after flowering. This will consist chiefly in the removal of a certain amount of old growth, and perhaps a little shortening back to suit the position. Shrubs which flower later in the season need pruning before growth starts, that is, during the Winter or early Spring.

In dealing with neglected or overgrown specimens it is sometimes necessary to be very drastic and to cut back everything to within a foot or so from the ground, just before growth starts. Sad looking specimens can be wonderfully renewed in this way, especially if the soil is stirred up and enriched at the same time.

In pruning shrubs for the effect of coloured stems in Winter, they may be cut back close to the ground in the Spring. If the gap this makes is objectionable for a time cut back only part each year. Many shrubs of the hardwood varieties are increased by the taking of cuttings or slips in the Fall or Winter. Be sure to take your cuttings from young wood. They should be from six to nine inches in length, the cuts to be made directly below the bud at the lower end of the cuttings and directly above the bud at the upper end of the cutting. Tie the young cuttings in bundles and bury head up in a cool cellar or cold frame, mulching with a little moss to prevent drying out. In the Spring lift the cuttings and plant them about half way in soil in rows four to six inches apart.

SOIL EROSION AND CONSERVATION ARE VITAL WORLD PROBLEMS AFFECTING EVERY HUMAN BEING

DR. O. M. MCCONKEY, *O.A.C., Guelph.*

Some Salient Observations Around the World

THE world is only 25,000 miles around. There is only a thin veneer of fertile soil over the globe, which took thousands of years to develop. Large areas have already been destroyed by man's misuse of soil and forests. Man must learn to live in equilibrium with his habitat, or he will continue to destroy the world's greatest resource and heritage, the fertile soil cover.

North America

We leave North America—a very young country only 100 to 400 years old—to go to an old country—China, 4,000 years old. As we traverse Canada and the U.S.A. we see a continent of great industrial and agricultural development, peace and plenty. But I warn you we must look after the conservation of our natural resources—now.

In America we have already exploited our forests, soils and other natural resources more than we realize, and in a very short time—100 to 300 years in the east and 75 years on the western prairies. The exploitation of our natural resources has been savage and rapid—perhaps unequalled in human history.

Fortunately, conservation measures are now being taken, initiated by a few far-seeing scientists who started soil conservation stations in the early 1920's—stimulated by the destruction in the "dust bowls" of the west in the dry 1930's, and the floods and soil erosion in the east. Governments, and the public, are now taking action. The U.S. Soil Conservation Service stands a living monument to the vision of President Roosevelt, who saw the danger ahead. Much remains to be done. However, we are making a good start. We must continue to push the conservation programme. We must plan for our children and our childrens' children. We must plan for a thousand years. Conservation and improved land utilization must be a continuous programme. We must be alert and observe what is happening to the soils and forests in our neighborhood, and take community action. Many of us are still not aware of what is happening to our soils and forests right at our door.

Japan

As we circle over Japan we see a well-balanced husbandry of forest cover and well-tended fields where erosion control measures have been taken. The Japanese have almost doubled their agricultural production in the last 60 years. This has been accomplished by the best technical minds available—graduate students, who were sent to study anywhere in the world where needed information and training was available. Also, by careful planning on a national scale, and by the patient, careful work of the peasants.

As we fly over the Yellow Sea—yellow with soil—and continue to study soil erosion in China, we find a continental land mass 25% larger than that of Canada. China is an ancient land, with records of agriculture going back 4,000 years. Pressure of population became acute in parts of the

country centuries ago, and equally long ago man began his struggles with soil deterioration. We in Canada and the U.S.A. can derive many lessons from the appalling affects of misuse of land and forests in China.

Despite the frugal, careful husbandry of the Chinese farmers, one sees a giant panorama—a continent—destroyed—sterile in many regions—the result of overpopulation, deforestation, absence of grass-legume soil-building crops in the rotations. You witness the end results of the misuse of land, and you also gain much knowledge of wise methods of land use. More Canadians and Americans should go to China to study soil erosion. You see the results after 4,000 years of farming.

Main Factors Which Cause Erosion in China

(1) The build is high towards the Tibetan plateau (15,000 ft.) in the west, and the rivers flow down to the Pacific heavily laden with silt.

(2) Overpopulation, which has denuded the land of forest and grass cover, results in maximum runoff and floods.

(3) The Monsoon rains from the S. and S.W. Pacific. Much of the water is lost as runoff from the denuded surface during June, July and August, causing floods, damage to crops, and famine.

(4) The high velocity winds which blow across North China from N.W. Siberia and the Gobi Desert cause soil erosion (as in Western America). Witness the great loss areas of N.W. China, and wind erosion over Manchuria and the North China plain.

(5) Competition for fuel is so great that most of the trees, grass and crop residues are used for fuel, causing runoff, erosion, floods, famine and poverty. Not enough crop residues are returned to the soil, hence organic matter is dropping. It is a vicious circle.

(6) Grasses and legumes, the soil builders, are not used in the rotations in China and the East as they are in the West—Europe and America.

The population is so heavy that the Chinese and Indians are forced to follow an extractive system of farming to produce human food grains, etc., which are eaten directly. They cannot follow our livestock system of farming, with good grass-legume crops in the rotation to build the soils, unless population is reduced.

(7) The Yellow River carries the heaviest silt load of any great river in the world. It transports from its watershed as much soil every year as all the rivers of the U.S.A.

The 1934 measurements of silt carried in the Yellow River show that the silt would cover over 350,000 acres to the depth of 3 feet.

India, Iraq, Iran, N. Africa and Greece

As one studies the agriculture of India, Iraq, Iran, Turkey, North Africa and Greece, the great problems are over-population and soil erosion, lands where there were great civilizations are now drifting deserts—the end results of the misuse of land. The Garden of Eden is now a desert.

World Data (approximate estimates)

(1) World population 2,250,000,000

(2) World population is increasing at.................... 2,000,000 per month

(3) World population will soon be........................ 3,000,000,000
(4) India increased—(1931-41) 30,000,000
(5) Arable farm land in the world....................... 4,000,000,000 acres
(6) Requires about 2.5 acres per man to maintain his food, clothing and shelter.
(7) At present, about half of the world's population, or 1,000,000,000, is now undernourished or near starvation.

Europe

As we left Greece and North Africa on the return trip home, and came up over Europe, we saw a very different picture from Far Eastern agriculture; something that was very encouraging for a change. There were well-cared-for fields and forests, very little erosion—where the soils have been maintained by good rotations of legumes and grasses and a livestock system of farming. Also, the forestry practices in European countries are the best in the world. German forestry is good. There is a planned organization of foresters on a township basis. "When you cut a tree, plant a tree" is the rule in Europe. In Aberdeenshire, Scotland, the rule is "plant two trees for every one you cut".

Britain

In Britain the soils are in good condition because of grass-legume rotations, fertilization, and livestock farming. There are 50,000,000 people in Britain on a much smaller area than Ontario and only 7% on the land as farmers. The total value of the agricultural production of Britain is greater than that of Canada. The countryside looks as neat as a landscaped garden. Junior farm leaders should go abroad to see the agriculture of Denmark and Britain, and to study their folk schools and their forestry. In Britain the children are taught nature study in the schools and homes. The British have done a good job of conservation in the last 1,000 years because they love the soil, trees and wild life; and they have practiced good farming methods.

North America

In America, although we have only settled this country a short time, we have already exploited and destroyed our forests and soils more than we realize because of careless farming and deforestation, water and wind erosion. Witness the results of water erosion in Ontario—the Ohio and Mississippi valleys, and the wind erosion of the western plains of America.

North America is a vulnerable continent. Our soil mantle can easily be wasted unless we take every precaution now and in the future to preserve it. Our soil mantle in America is more easily destroyed than in Britain and Europe, because in Eastern America man has cut away much of the natural protecting forest cover. Our rainfall often comes in heavy, eroding rains of 2 to 4 inches, and also as splash thunderstorms, which cause soil erosion—not like the gentle, misty rains of Britain and Europe, which do no harm. There is also a high proportion of easily eroded, intertilled crops. In N.E. America there is now heavy runoff of water from melting snow over frozen, bare ground in the Spring, which causes destructive floods and erosion. The snow melted slowly under the original forest cover.

In Western America there is a high proportion of plains subject to wind erosion from high velocity winds. For example, I remember as a boy, in 1905, in Alberta, I saw the original prairie, without a furrow turned. The prairie was the result of a million years of adaptation—a climax vegetation of different grasses and plants in equilibrium with the dry conditions and wind—a carpet of grass over which the high velocity winds blew without disturbing a particle of soil.

The soil was thick with fibre and organic matter—so thick that we used it to build sod houses. When we were plowing, the sod was so resilient that sometimes a furrow slice would start twirling and flop back in the furrow for a quarter of a mile. We, the settlers, turned that thick sod over, cut it up with a disc, harrowed it, made a fine seed bed, and grew wonderful crops of wheat and oats. However, we disturbed the "balance of Nature". In less than ten years of this treatment the prairie soils were drifting like snow, piling up on the road allowances, eddied by the clinging tumbling mustard and Russian thistle plants on the three-wire road fences. I have seen thousands of acres of young wheat four inches high blown clear down to the plow sole. The stones and bare plow sole remaining remind me now of the stones on the bare floor of the Gobi desert.

Conservation measures had to be taken. Crested wheat grass was introduced from the plains of Russia to restore fibre to soils, more grass and legumes introduced in the rotations; the combine tiller was introduced and now leaves trash on the surface which prevents erosion. Winter rye was introduced, and a simple, practical method of seeding oats on the Summer fallow, which stops soil drifting and provides pasture in the Fall. Strip farming was introduced. When you fly over the bad blow areas of the West now they appear like a mosaic of strips. The Prairie Farm Rehabilitation Act has implemented good conservation work in the Canadian West. There will be another cycle of dry years in the West. We must plan now to prevent soil drifting, which will surely come again as it did in the thirties and following the expansion of wheat cultivation during World War I.

When the first settlers came to Ontario, 100 to 200 years ago, Nature was in equilibrium, following a million years of adaptation and colonization by the natural vegetation, forest cover and wild life. There were many clear running streams and springs, no floods or erosion, and nature was in balance. When the early settlers cut away the trees the balance of nature was upset, and then trouble began. Man must learn to cultivate his fields and tend his forests, and to keep as near a "balance with nature" as possible. Man must learn to live in equilibrium with his habitat.

We Have a Great Heritage in Canada

When I returned to Canada I was impressed again with the great heritage we have in our forests and soils. All Canadians, urban and rural, must work together to conserve our resources.

I was glad to see good progress being made in conservation. There is developing a strong public support for conservation, and excellent work is being accomplished. Eleven river authorities have been set up in Ontario. Zone foresters have been appointed and reforestation increased at provincial and county levels. Legislation has been passed to prevent the destruction of young trees. Many local conservation projects have been started,

contour cultivation and strip cropping is starting, soil surveys, land utilization mapping and soil building programmes are being carried out. Measures to protect wild life are being carried out, and the pasture and hay programme is being pushed.

However, much remains to be done. We are making a good start—we must continue to push the conservation programme. We must plan for a thousand years. Conservation and improved land utilization must be a continuous programme. We must be alert and observe what is happening to soils and forests in our neighborhood, and take community action.

The Problem in Ontario

The percentage of forest cover in Ontario is below what is necessary to maintain balance. It should be 20%. Floods are increasing, water level is dropping, there is a growing deficiency of water for domestic, industrial and hydro uses; there is sheet and gully erosion taking an annual toll of soil from our fields; there are increasing soil deficiencies causing nutritional problems in plants and animals, and cash cropping has reduced the organic matter of our soils in some regions in spite of the increased yield resulting from the introduction of many excellent improved disease resistant crop varieties. The average of the provincial crop yields has remained about stationary—dropping soil fertility level is the fundamental reason. There is need of plowing under more legume green manures—more grass-legume mixtures in our rotations to prevent runoff and to build organic matter, and fibre and fertility in our soils.

Good grass-legume rotations, manure, minerals, and livestock farming form the foundation of effective soil conservation and soil fertility.

PERENNIALS FOR THE ROCK GARDEN

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YOU will notice that the heading is "Perennials For the Rock Garden", not rock garden plants or "Alpines" as they are commonly called. There is a distinction which should be clarified at the start. The title allows the inclusion of some plants that would cause a shudder to run down the spine of many who read the quarterly journal of the Alpine Society. At the same time it relieves us of the discussion of many Alpines that can only be grown by those who delight in coddling fussy individual plants.

To be technically correct, a rock garden should only be placed on a natural sloping bit of ground facing north or east in a remote corner of the estate where we can imitate an Alpine setting with "scree", "morraine" and cliffs. In such a quiet spot we can get delight from individual treasures struggling to maintain existence, rather than from the massed colour effects that appeal to the majority closer to home. Rarely do we find such a suitable setting in a city back garden and even more rarely do we find it in front.

Whether or not we approve of the practice, we must face the fact that many people who really are not the proper gardening type, are going to insist on having rock gardens in improper situations. Those are the people I must try to rescue from disappointment, because very often a scree of gravel can end in a scream of grief.

The redeeming feature about rock gardening is that, as in other forms of gardening, once a beginner starts actually doing the work himself, interest develops quickly and he or she responds gradually to the challenge that evolves a higher type of gardening.

Colourful Plants

It would not be fair to start our discussion of plants without a brief description of the picture we want them to paint for us. We are striving to imitate a natural outcrop of rocks and gravel on a hillside if possible, or if we insist in a depression in the centre of a level piece of ground. We want to clothe it with appropriate and colourful plants.

In nature, rocks are usually found in more or less even, tilted layers called "strata". After they have been exposed to weathering for a long time they begin to crumble so that the edges are jagged and the spaces between the upper edges of adjoining strata become at last partially filled with a mixture of stone chips, gritty soil, and decaying grass and roots. As most of our natural surface rocks are limestone, this broken down aggregate is alkaline in reaction.

We will find low creeping plants rooting at every joint and clinging to the bare rocks by taking root in each small crevice. When in bloom like the native sedum in July, they form mats or tracery of bright colour. Most of the season their bright or grey-green foliage softens the jagged rocks into rounded mounds.

Just beyond them on the flat areas of the thin gravelly soil we find groups of small mossy mounds sending up slender stems with round or star-shaped flowers in Spring or early Summer before the hot dry weather cuts down their moisture supply. Farther back in the deeper soil near the face of the next strata where there is more moisture, grow taller plants with more leaf surface putting up spikes or rounded heads of bloom against the background of a protecting rock. At the top of the slope where the overburden of soil runs down to the top layer of rock, evergreens and deciduous shrubs will form a background and a frame.

That is the natural picture we try to imitate. Those are the types of plants we use.

In general they demand rather poor gritty soil which is slightly alkaline in reaction. Any compromise with clay soil or rich loam is attended with disaster unless we use quite different plants which look out of place.

Regale Lilies, Board of Education Building, Kingston.

Drainage at the surface must be good. A surface of stone chips is necessary for things like Saxifraga to keep the crowns up out of the moisture. But all like a constant supply of moisture lower down from the cool rocks. In Canada even the three Alpines prefer a slight amount of shade from our hot dry Summer weather and appreciate the shelter on the north or east side of a high rock. Provided we use shade tolerant plants such as bulbs or our native wood dwellers we may have rock gardens in fairly dense shade.

As this talk deals with plants we will not take time to discuss construction. There are books and bulletins on that subject. Before you start study nature carefully and remember that rock gardens are the most expensive

in outlay and the most demanding in attention to detail in maintenance of any type.

Most rock plants can be grown from seed sown in Spring in pots or flats and the young plants pricked off into flats as soon as they are large enough to handle. They should be ready to plant into their permanent position in the rock garden early in September or the following Spring. Some like Iceland poppies are best sown in their permanent position and thinned out, as they do not like to be transplanted.

It is difficult to give detailed directions as to the arrangement of the plants. One must learn from experience where plants look best and the most suitable combinations. In the average rock garden most annuals are out of place and there is no room for perennials which grow more than a foot or fifteen inches in height. Tall plants dwarf the size of the rocks and spoil the illusion of natural cliffs.

Suitable Plants

Generally speaking, plants suitable for the rock garden may be divided into six groups:

(1) Plants which form small tufts or mounds of foliage with erect flowering stalks. They look best in crevices between rocks, in small pockets or gravelly flat areas near paths—Armeria, Draba, Heuchera, Houstonia, Saxifraga, Sempervivum.

(2) Erect growing sorts which look best in larger groups where they will be viewed more often from a distance. When planted at the top of a slope they add to the illusion of height—Delphinium chinense, Lychis, Veronica, Teucrium.

(3) Trailing or prostrate plants which sprawl over the face of rocks and cascade from pocket to pocket to form large drifts of colour when in bloom—Alyssum, Campanula, Dianthus, Aubrieta, Phlox subulata.

(4) Creepers which form close mats of foliage over level pockets or the face of rocks. Plants which root at the joints and follow each seam in green tracery—Arenaria, Lotus, Sedum, Thyme.

(5) Bulbs of low-growing species which should be planted in the Fall in large groups, or, in the case of smaller sorts, cascading down the slope from pocket to pocket to form a waterfall of Spring colour. They may be planted to come up through the creepers—Chionodoxa, Scilla, Species Tulips, Small Daffodils.

(6) Low-growing shrubs and evergreens to use at the top and to break up large spaces—Dwarf Spruce, Juniper, Euonymus, Cotoneaster, Barberries.

The rock garden is never finished. As experience leads to knowledge and personal preferences develop, an irresistible urge will likewise develop to tear down the old and build up anew to meet the requirements of some pet plant or carry out some new fancy. Gardeners are like that.

As an endless list seems monotonous we will confine ourselves to remarks on a few slides. Those who want the list for future reference may obtain a copy at the desk.

	Botanical Name	*Common Name*	*Height*	*Colour of Bloom*	*5-Year average Time of Bloom*
	Achillea calavennas	Milfoil	6″	White	May 29-June 26
	Aethionema pulchellum	Aetheonema	4″	Rose Purple	May 30-July 15
	” Var. Warley Rose	”	6″	Bright Rose	May and June
B	Alyssum saxatile compactum	Cloth of Gold	12″	Yellow	June 15-July 15
	” ” citrinum	”	12″	Yellow, pale	May 15-June 20
B	” montanum	”	3″	Yellow	May 15-June 20
	Arenaria Grandiflora	Sandwort	6″	White	June 15-Aug. 10
B	” montana	”	4″	”	June 10-July 20
XB	Arabis albida	Rock Cress	6″	”	May 5-June 5
XB	” ” Lissadel Pink	”	6″	Rose	May 5-June 5
	Aubrietia deltoidea	Purple Rock Cress	4″	Pink to Violet	May 15-July 1
B	Aster alpinus	Alpine daisy	9″	Purplish Blue	June 5-July 5
XB	” hybrida	New dwarf daisy	9″	Lavender to Pink	Sept. 1-Oct.
	Campanula barbata	Bellflower	12″	Pale Blue	June 15-July 15
	” Carpatica	Carpathian Harebell	9″	Blue	July 1-Aug. 15
	” ” alba	“ “	9″	White	July 1-Aug. 15
	” elatines	Bellflower	3″	Pale Blue	July 1-Aug. 15
B	” garganica	”	6″	Bright Blue	July 1-Aug. 15
B	” Portenschlagi’na	Wallflower	6″	Purple Blue	June 15-July 15
	” Poscharskyana	Bellflower	6″	Pale Blue	June 15-July 15
	” rotundifolia	Harebell	9″	Blue	June 15-Aug. 15
B	” turbinata	Bellflower	9″	Blue	June 15-Aug. 15
	Dianthus arenarius	Pinks	6″	Pale Purple	June 9-Aug. 15
	” brevicaulis	”	3″	Rose Pink	June 5-Aug. 7
B	” Caesius	Cheddar Pink	9″	Rosy Pink	June 11-Aug. 10
B	” deltoides Brilliant	Maiden Pink	9″	Red	June 11-Aug. 14
B	” Plumarius	Garden Pink	9-12″	White-Rosy	June 16-Aug. 17
	” superbus	Pink	12″	Pale Purple	June 6-June 30
	Dodecatheon maedia	Shooting Star	12″	Pale Purple	May 25-June 10
	Draba aizoides	Whitlow Grass	3″	Yellow	April 27-May 10
	” olympica	”	3″	”	April 15-May 6
B	” repens	”	3″	”	April 24-May 22
	” rigida	”	3″	”	April 28-May 26
	Edryianthus graminifolius	Wahlenbergia	2″	Violet Blue	June 11-July 2
	Gentiana septemfida	Gentian	12″	Blue, spotted	July 25-Sept. 5
	” Lagodechiana	”	6″	Pale Blue	July 26-Sept. 5
	Geranium argenteum	Cranes-bill	6″	Pale Purple	May 28-June 17
	” lancastriense	”	9″	Fresh Pink	June 6-June 30
B	Gypsophila repens	Dwarf Baby’s Breath	9″	White and Pink	June 6-July 22
	Houstonia coerulea	Bluets	6″	Pale Blue	June 5-Aug. 1
XB	Iberis sempervirens	Candytuft	9″	White	May 25-June 18
	Linaria alpina	Toad Flax	3″	Violet and Orange	June 10-July 15
B	Linum flavum	False Flax	12″	Lemon	June 3-Aug. 28
B	” perenne	”	18″	Blue	June 13-Aug. 28
	Lychnis alpina	Campion	3″	Bright Rose	May 25-June 14
	Myosotis alpestris	Forget-me-not	6″	Blue and Pink	May 6-June 16
B	Oenothera missouriensis	Evening Primrose	9″	Pale Yellow	June 28-Aug. 11

Papaver alpinum	Alpine Poppy	6"	White-Orange	May 20-June 21
B Phlox subulata varieties	Moss Pink	9"	White Lilac, Deep Rose	May 13-June 10
B Pentstemon glaber	Beardstongue	9"	Blue Pink	June 3-July 14
Primula cortusoides	Primrose	9"	Rosy Purple	May 4-June 2
" denticulata	"	12"	Pale Violet	April 28-June 14
Phyteuma Scheuchzeri	Horned Rampion	10"	Violet Blue	June 15-July 8
Saponaria ocymoides	Soapwort	6"	Pink	
XB Saxifraga, see separate list	Faxifraga			
XB Sedum Saxifraga, see separate list	Stonecrop			
Sempervivum, see sep. list	Houseleek			
Tunica saxifraga	Coat Flower	6"	Pink	July 1-Sept. 15
B Thymus serpyllum	Thyme	6"	Pink-Purple	June 9-Aug. 3
B " " album	"	6"	White	June 9-July 23
" citriodorus aureus	Golden Thyme	9'	Golden foliage	July 10-Aug. 16
B Veronica prostrata	Speedwell	3"	Bright Blue	June 6-June 28
B Viola cornuta papilio	Tufted Pansy	4"	Blue & White	May 15-July 15

Plants Which Spread Too Rapidly for the Small Rock Garden

Botanical Name	*Common Name*
Anemone Sylvestris	Wood Anemone
Cerastium Tomentosum	Snow in Summer
" Biebersteinii	" "
Convalaria Majalis	Lily of the Valley
Herniaria Glabrata	Rupture Wort
Oenothera Pumila	Dwarf Evening Primrose (fine seeds spread everywhere)
Linaria Cymbalaria	Kenilworth Ivy
" Pallida	Toad Flax
" Repens	Creeping Toad Flax
Lysimachia Nummularia	Creeping Jenny
Sedum Acre	Stonecrop

Plants Suitable for Shade

1. Arenaria Grandiflora	Sandwort
2. Arabis Albida	Rock Cress
3. Anemone Sylvestris	Wood Anemone
4. Campanula Species	Bellflower
5. Gentiana Septemfida	Gentian
6. Geranium Lancastriense	Cranesbill
7. Iberis Sempervirens	Perennial Candytuft
8. Myosotis Palustris	Forget-me-not
9. Phlox Subulata	Moss Pink
10. Primula Species	Primulas
11. Tunica Saxifraga	Coat Flower
12. Viola species	Violets and Pansies

15 Rock Garden Bulbs for Beginners

Chionodaxa Luciliae	Chionodaxa, blue with white centre
Crocus Sieberi	Crocus, light blue
" Susianus	" bright yellow
" Versicolor	" lilac
Fritillaria Meleagris	Turk Cap
Galanthus Nivalis	Snowdrop
Leucojum Vernum	Snowflake
Lilium Tenuifolium	Coral Lily, orange red
" Concolor	" "
Muscari Botryoides	Heavenly Blue Grape Hyacinth, blue
Ornithogalum Umbellatum	" " " " white
Pusch Kinia Libanotica	" " " " white, striped blue
Schila Sibirica	Squill, blue
*Tulipa Clusiana	Tulip species, pink and white
" Dasystemon	" " white, yellow centre

*Only dwarf species are suitable.

10 Rock Garden Shrubs for Beginners—Deciduous

Berberis Thunbergii Minor	Box Barberry
" " Atropurpurea	Purple Leaf Barberry
Citisus Nigricans	Broom
Cotoneaster Adpressa	Cotoneaster
" Horizontalis	"
Daphne Mezereum	Daphne
Genista Pilosa	Greenweed

Conifers

Chamaecyparis Obtusa Nana	Dwarf Retinospora
Juniperus Horizontalis Douglassi	Andora Juniper
" " depressa plumosa	Waukigan Juniper
" Sabina Tamariscifolia	Tamarisk Juniper
Picea Abies Maxwelli	Dwarf Norway Spruce

10 Good Sempervivums for the Beginner

Sempervivum Atropurpureum	Sempervivum Soboliferum
" Arachnoideum	" Spinosum
" Calcarium	" Tectorum
" Gandinii	" Triste
" Rubicundum	" Wulfeni

These do not come true from seed. One must buy the plant.

10 Good Sedums for the Beginner

Sedum Album	Sedum Middendorffianum
" Brevifolium	" Sexangulare
" Dasyphyllum	" Sieboldii
" Ewersii	" Spurium Coccineum
" Kamschaticum	" Anacampseros

Sedums grow best in poor soil without leaf mold.

15 Saxifrangas for Beginners

Encrusted	*Not Encrusted*
Saxifranga Aizoon Brevifolia	S. Petroschii, white
" " Lutea	
" " Rosularis	S. Apiculata, pale yellow
" " Linguiformis	S. " Alba, white
" " Rosea	S. " " white
" " Notata	
" Cotyledon Pyramidalis	S. Godseffiana, yellow
" Pectinata	S. Jenkinsii, pinkish lilac
" Mackabiana	*S. Decipiens Hybrids

*These may be grown from seeds. None of the others come true. The Saxifragas need lime supplied by old mortar rubble.

THE VALUE OF FLOWERS IN THE HOME

MRS. RYLAND H. NEW, C.B.E., *Oakville.*

THIS topic is an all embracive one, covering almost any angle of horticulture, but I would like to approach it from the purely amateur aspect, thinking of flowers as an asset, indeed, a necessity to the home. You cannot rent a home, you must produce it from the material at hand. The finest furnishings will not give the "home" effect that will be achieved with flowers, where we enjoy a mental, moral and manual value.

Many persons have no interest whatever in flowers, but happily enough, time appears to be producing more gardeners than scoffers. Even the scoffer gains peace of mind and body in the presence of beauty, and the greatest beauty in the world is found in growing things. Nature is the visible aspect of life itself. A bright bouquet in the home will give pleasure and relaxation to the wage-earner returning from prosaic and monotonous tasks in office or shop. The housewife on her round of duties will find work moves more easily and pleasantly when she has plants to attend. It is a well known fact that flowers are of immeasurable value to the sick and convalescent, providing a link between bedroom and the outdoors, where nature and her health-giving elements give promise of renewed vigour and a brighter future.

There is a moral value in flowers. This is an age of juvenile delinquency, largely due to crowded cities, congested living accommodation, and lack of training children should receive from those responsible for them. Give a child something he can call his own, be it flower pot or garden. Let him select his own seeds, show him the proper planting and let him learn from experience and guidance how they must be tended if they are to reward the owner. Beautiful displays of bloom are to be found in windows of farm homes where geraniums, impatiens, cacti, begonias, fuschias and ferns flourish in tin cans and pails. A man, woman or child who loves growing things will seldom have time to appear in police courts. Many moral troubles stem from those having too much wrong kind of time on their hands.

Then comes the manual value of flowers. Fresh air, sunshine, and light labour will result in good health, vigour and a restful sleep that needs no assistance from sleeping pills. Flowers must be cared for, but they must not become a labour to the point of sapping physical strength.

In your garden you must be guided by the space at your disposal. Catalogues list almost every plant your heart could desire. We all have favourites, but cannot afford all of them. There are inexpensive gems that anyone can afford, shrubs of beauty which may provide loveliness for years. If we cannot have expensive evergreens, then let us have a flowering quince, mock orange or honeysuckle. Or we might have a window box of neat construction, nicely painted and featuring plants suitable for such a garden.

Bulbs

Bulbs are now plentiful and reasonably priced; they are easily grown and fill a double bill in gardening life. They may be forced for winter bloom, then planted in the garden. Hyacinths, narcissus, lily of the valley and many others may be forced indoors to brighten the room. If you wish

to invest in something which will give expectation and satisfaction, purchase a hybrid amaryllis which gives gorgeous, flamboyant bloom. For a large window with plenty of light try the Haemanthus or blood lily. Ferns add a touch of grace and delicacy to a dull corner. A plant can become a highlight in any home.

Horticulturists and scientists have made a wonderful contribution to modern life, but nature in her wild state offers us a vast storehouse with an open door. By going a few miles from home, plants and shrubs may be lifted with care and discretion, and brought into cultivation, where they often do better than in their wild state. Hepaticas, blood root, trillium multiply when placed in a favourable spot in the garden. For a damp, dull spot try a clump of marsh marigold to give sunshine and colour to green surroundings. Clumps of small cedars, high or low bush cranberries and a host of other wild things provides gardening enjoyment.

Now may I dwell briefly on "musts" for flowers. Containers act much as a frame does for a painting, as it enhances and sets off the blossoms. Cost looms large as we picture the need for a colour scheme, but great cost is not necessary. An old jug, tumbler, discarded goldfish bowl, and even a gem-jar will provide as many different shapes and sizes of containers as the average person wishes. A cup that has lost a handle, a jelly jar or a sauce dish can be the base of a small and pleasing bouquet that will delight the eye.

When lovely gladioli have withered to the point where you cannot use them longer, cut off the tips or even the single florets and float them in a very low bowl or even a plate. A pie tin makes a wonderful receptacle for a huge dahlia whose head will not stand up, but which looks marvellous on the table with a few of its own leaves. These and many other ideas will enable you to find a use for so-called cast-offs. The dining room table should have a plant or bouquet that will not obstruct view. There is nothing worse than bobbing your head one way, then another, to see the persons opposite. Better a lovely little low jar of evergreen and mahonia than the longest stemmed roses if you wish to promote friendliness and conversation at meal-time.

I have tried to make some suggestions which may be of value to those who possess the spirit of adventure. Indulge yourself to the limit with the beautiful things provided by greenhouse and nursery, but keep in mind that the garden, within and without the house, is an adventure and reflects the individuality and tastes of the owners. Experiment with the things you like best and gain experience from these experiments. Teach the young and the beginners to value the things nature has given us for our use and pleasure. Bring the outdoors inside for Winter. Cut your forsythia and pussy willows, and salvage prunings from your shrubs and fruit trees. Many will bloom and provide a most picturesque arrangement for enjoyment by the family. Make the most of the beauties of nature and realize the truth of the words:

> The kiss of the sun for pardon,
> The song of the birds for mirth—
> One is nearer God's heart in a garden
> Than anywhere else on earth.

PRESENTATIONS

J. E. Carter Trophy for Rural School Ground Improvement, 1949—
Won by S.S. No. 5, Wainfleet, Welland County.
Received by teacher—Miss J. A. Carlin, Wainfleet.
Presented by J. E. Carter, Guelph.

Hon. P. M. Dewan Trophy for Rural School Ground Improvement, 1949—
Received by W. G. Rae, Hanover (Public School Inspector).
Presented by J. A. Carroll, Toronto.

A. J. Jackman Trophy for Windbreak Competition, District No. 9—
Won by Laverne Hewitson, Owen Sound, R.R. 5.
Presented by A. J. Jackman, Owen Sound.

REPORT OF RESOLUTIONS COMMITTEE

KEN GARDINER, *Chairman.*

1. Be it resolved that this Association express appreciation to the Ontario Government, through Col. the Hon. Thomas L. Kennedy, Minister of Agriculture, for continued financial support of our organization as evidenced in the grants, which are so important in assisting the Societies to promote their work.

2. That this Association continues to be appreciative of the valuable co-operation of Agricultural Representatives, District and Zone Foresters, Public and Separate School Inspectors throughout the province.

3. That the thanks of the Association be expressed to Mr. J. E. Carter, Guelph, for his generous assistance in providing the J. E. Carter Trophy for Rural School Ground Improvement; to Hon. P. M. Dewan for School Ground Improvement Trophy; to A. J. Jackman, Owen Sound, for School Ground prizes, also trophy and cash prizes for Windbreak Competition; to the T. Eaton Company for many favours and prizes to assist in beautification; to J. E. Carter and the Ontario Conservation and Reforestation Association for prizes in School Forestry Competition, and to Mrs. D. A. Gillies, Arnprior, for Essay Competition prizes.

4. That in view of continued support of horticulture by the daily and weekly newspapers and farm magazines, this Association expresses sincere appreciation.

5. Resolved that congratulations be extended to the Hamilton Horticultural Society on their Centennial Anniversary and appreciation for their assistance with the arrangements for this convention.

6. That the appreciation of the Association be extended to all those who have taken part in the convention programme, also to those providing decorations; to the Royal Connaught Hotel for their courteous assistance in making this 44th annual convention an outstanding success.

7. Resolved that the National Film Board be requested to provide more films dealing directly with horticultural subjects, in line with more recent developments in horticulture.

8. Resolved that this Association deplores the marked falling off in amount of exhibits and cut flowers at the Canadian National Exhibition, and recommend to the management that a study be made with the object of reviving interest and participation in the Horticultural Section.

That the management be asked to provide easier access to the grounds for exhibitors; that the west wing be open to Horticultural Societies on the first two days of the Exhibition for exhibits of cut flowers to be shown in various classes, to be approved by the Floral Committee; that prize money be available for juvenile exhibits, acceptable to the Floral Committee, and that money for same be paid by the C.N.E.

9. Resolved that the Dominion Government, through its printing department, publish more free literature, written by Canadians for Canadians, on the subject of Horticulture.

As an alternative the Resolutions Committee recommend the following:

This committee recommends that the Societies be advised from time to time of the facilities at present provided by the Publicity Bureau of the Department of Agriculture at Ottawa.

10. Considering our responsibility to the Horticulturists of Ontario this Association goes on record, warning its members of promoters who publish unusual benefits to prospective members, without giving details of their personnel, and also wish it to be known that this organization is not affiliated in any way with the Canadian Garden Club, recently publicized in the press.

HORTICULTURAL EXPERIMENT STATION

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REPORT FOR 1947 and 1948

SODS AND GREEN-MANURE CROPS REBUILD SOILS DEGRADED BY CULTIVATION

ONTARIO DEPARTMENT of AGRICULTURE

Printed by order of

HON. THOMAS L. KENNEDY, Minister of Agriculture for Ontario

CONTENTS

HORTICULTURAL EXPERIMENT STATION

Vineland Station, Ontario, Canada

BIENNIAL REPORT, 1947 and 1948

This Biennial Report of the Horticultural Experiment Station was delayed a full year, in its final preparation, through several difficulties. As now published, it makes no attempt to cover all Station activities, either extensively or briefly. A few investigations are reported in some detail, while other projects and matters of interest are briefly noted.

The accumulation of data and the stage reached in the investigation warrant publication of the soil-fertilization studies with the Concord grape. The report (page 15) is a final summary of work done in the Haines vineyard near Jordan, during the 19-year period 1929 to 1947. An earlier report on this project, covering severity of pruning studies in relation to soil fertilization, was published in 1938 in Scientific Agriculture.

A second research project reported in some detail (page 32) is concerned with organic-matter problems, and particularly some changes in a soil after 10 years of various sods and green manures with supplementary fertilization treatments.

There are two other brief soil studies. One concerns the length of the cultivation period in an apple orchard. The 20-year investigation notes (page 30) some effects of reduced cultivation on the physical and chemical condition of the soil. The other study presents data showing the effect of small gully-erosions on tomato yields (page 44).

Weather records have been kept continuously since 1916. The accumulated data for the 33-year period, 1916 to 1948, are summarized (page 48). In particular, the 20-year period 1929 to 1948 is examined in some detail, using graphs and charts.

The breeding work with two fruits, the cherry (page 59) and the grape (page 66), is given in some detail. Earlier Station reports dealt similarly with the peach and the strawberry (Biennial Report for 1943 and 1944), and *rubus* species, sweet corn, and greenhouse tomatoes (Biennial Report for 1945 and 1946).

Pages 5 to 13 of the present report are brief references, in picture and word, to various Station projects, relationships, physical equipment, and other matters of interest.

TECHNICAL STAFF, 1948

E. F. PALMER, B.S.A., LL.D.	*Director*
W. H. UPSHALL, B.S.A., M.S., PH.D.	*Chief in Research*
D. L. BAILEY, B.A., M.S., PH.D.	*Pathologist*
O. A. BRADT, B.S.A.*	*Assistant in Research*
A. N. L. BUTLER, B.S.A., M.S.	*Associate in Research*
G. H. DICKSON, B.S.A.	*Assistant in Research*
C. B. KELLY, B.S.A., M.S.	*Assistant in Extension*
E. A. KERR, B.A., M.SC., PH.D.	*Assistant in Research*
O. J. ROBB, B.S.A.	*Assistant in Research*
IAN D. W. SMITH, B.S.A.†	*Agricultural Scientist*
W. J. STRONG, B.S.A., M.S.A.	*Assistant in Research*
J. R. VANHAARLEM, B.S.A., M.S.	*Associate in Research*

* Dept. of Horticulture, O.A.C. Guelph.

† Division of Horticulture, Experimental Farms Service, Ottawa.

STAFF CHANGES

Mr. W. J. Strong, Research Assistant, first appointed to the technical staff in 1921, reached retirement age at the end of 1948. Throughout his 27 years with the Station he was in charge of the experimental and breeding work with small fruits and nuts. Also, for a considerable period, he carried on an extensive breeding project with sweet corn. The small fruit and sweet corn introductions of the Station constitute one very tangible result of Mr. Strong's many years of effort and discernment.

Mr. O. A. Bradt, until recently on the staff of the Ontario Agricultural College as lecturer in Horticulture, has been transferred to the Station staff as Assistant in Research. During the period 1946-48 Mr. Bradt divided his time between Guelph and Vineland, lecturing during the academic year, and assisting at Vineland during the summer. At Vineland he will have charge of the experimental and breeding work with peaches and grapes, the latter including the new 35-acre Sub-station.

Mr. Ian D. W. Smith, Agricultural Scientist, Division of Horticulture, Experimental Farms Service, Ottawa, has been assigned to the Station staff to assist in vegetable work. This constitutes a co-operative approach, as between Dominion and Provincial services, to certain vegetable work including the foundation seed projects, and the merit and verification trials with the Canadian Seed Growers Association.

THE HORTICULTURAL PRODUCTS LABORATORY

Construction of the Horticultural Products Laboratory began late in 1947 and it is expected to be in partial operation in 1950. Yet to be installed are the complex machines and services needed in a modern laboratory. Some phases of the work may be retarded pending the training of suitable staff.

The name of the laboratory infers that investigations would be limited only by the raw materials used. They must be of horticultural origin. What may be done with those raw materials is unlimited. Obviously the investigations will include such processes as storage, canning, freezing and fermentations in relation to newly imported varieties of fruits and vegetables, and to new varieties bred at the Experiment Station. But the work may include other than primary food products and it might result in the production of materials such as useful chemicals. Human nutrition as it is correlated with fruits and vegetables will be a major interest.

The building, its services and its machines were designed to be as flexible as possible so that changes in the work of the laboratory might be easily manipulated. Some of the desired flexibility was obtained with the use of temporary partitions, and having all pipe lines visible rather than buried in walls.

The semi-basement space consists largely of refrigerated areas which, when completed, will give a range of temperature from 40 degrees below zero F. to any desired higher temperature. Approximately one hundred temperatures will be available at one time.

Nine laboratory rooms will be available on the main floor. The largest laboratory is 65 feet long by 17 feet wide and will be used as a processing room.

THE DOMINION FRUIT INSECTS LABORATORY

In 1911 the Ontario and Dominion Departments of Agriculture entered into an arrangement whereby the Dominion placed an entomologist at the Horticultural Experiment Station. His immediate job was to study fruit insects and their control, more particularly as they affected the tender fruit crops of southern Ontario. The Station was to provide necessary facilities—office and laboratory accommodation, orchards, etc.

Mr. W. A. Ross was the first, and for some years the only, entomologist to be stationed here. However, as the research program with fruit insects grew, and was expanded to include greenhouse insects, there were staff additions from time to time. The present staff, with Mr. G. G. Dustan as Entomologist-in-Charge, consists of seven technical workers.

Increased staff meant, finally, increased office and laboratory facilities, beyond the ability of the Experiment Station to provide. In 1925 the Dominion Department of Agriculture erected its own building. This was enlarged in 1934, and in 1939 greenhouses were added. Both the building and the greenhouses are attached to Experiment Station services.

The laboratory is primarily concerned with investigations of insect pests of fruit crops and a general study of new insecticides. More specific lines of research include: Studies over the past 39 years of the life histories and habits of most of the insect pests of fruit in the Niagara Peninsula; chemical and biological control of such major pests as the codling moth, Oriental fruit moth, pear psylla and aphids; a long term study of the effects of spray chemicals on the fauna of peach orchards; and insecticide investigations in the greenhouse.

This dominion-provincial co-operative approach to the study of economic insects makes unnecessary similar studies by the Experiment Station. It leaves the Station free to concentrate on cultural investigations, fruit maturity and marketing problems, processing, plant breeding.

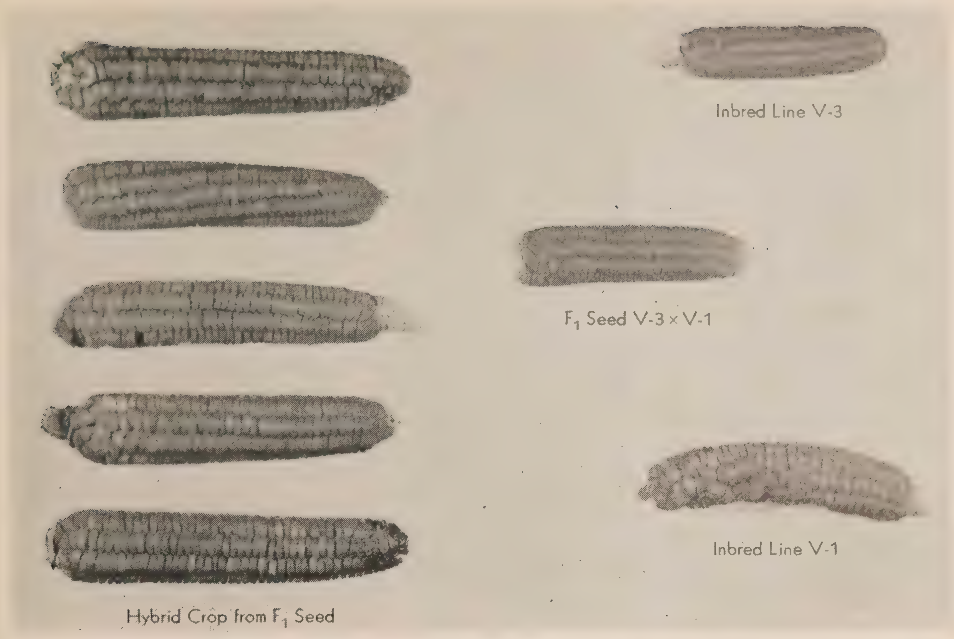

FIG. 3. Vinecross B5 mature ears (left). This hybrid sweet corn is being grown commercially in increasing amount.

SWEET CORN BREEDING

New varieties of sweet corn as now introduced are almost invariably first-generation hybrids produced by crossing two inbred lines. Years of work are required to stabilize a new inbred line. It then has to be crossed with other inbred lines to determine its ability to produce superior hybrids. Experiment Stations in the United States have been generous in supplying us with their inbred lines, and these have been crossed with our own inbred lines. Seventy-seven experimental hybrids, together with fifty-one commercial varieties were tested in our trials in 1947 and 1948. Some of these hybrids and varieties were very promising.

Most high-quality hybrids mature in the season from Vinecross B5 to Golden Cross Bantam. In general, the early and the late hybrids have medium to low quality. A complete succession of high-quality hybrids is wanted. To this end, a breeding program is under way at this Station to develop high-quality, productive inbreds. From these it is hoped to produce the desired hybrids.

The varieties Vinegold and Vinecross B5 have been introduced by the Horticultural Experiment Station. Vinecross B5 has exceptionally high quality both as a home-garden and as a freezing variety. For size and quality it is equal to the best ears produced by Golden Bantam. In fact, both its parents were developed from Golden Bantam. Vinegold is a larger-eared variety than Vinecross B5, of very high quality, and has proved exceptionally suitable for canning. It is well liked by the market gardener as a variety to come in just before Golden Cross Bantam. It received very favorable mention in the Canadian Vegetable Trials of 1948.

THE LODGE

The Experiment Station is too far removed from any considerable centre of population for single workers, technical or labour, generally to find private accommodation. Therefore it has been necessary for the Station to provide both rooms and board.

In the early days the Administration Building, built in 1909, served also as a dormitory for single staff members and student assistants. The inconvenience of this arrangement was not particularly marked until recent years, but staff additions since 1945 have required the full use of the Administration Building for its initial purpose, offices and laboratories.

To properly take care of present-day needs, including dining-room accommodation, a dormitory-boarding-house, "The Lodge", is nearing completion. It will provide rooms (double) for 20 persons normally, in addition to service staff. Dining-room accommodation and kitchen services are adequate for 30 people. Also there is a large living-room and other (basement) space for recreation.

All this accommodation will eventually be required for student assistants, graduate students, and those members of the permanent technical staff who, by choice or otherwise, are bachelors. The Horticultural Products Laboratory, also nearing completion, will be staffed in part with graduate students, requiring temporary accommodation at least.

Similarly, the Dominion Fruit Insects Laboratory (page 6) has its summer-time student assistants, its graduate students, and its confirmed bachelors, for whom accommodation will be found in The Lodge. Single members of the labour staff will have to be taken care of elsewhere.

MALLING STOCKS AND FRENCH CRAB SEEDLINGS AS STOCKS FOR FIVE VARIETIES OF APPLES

For 18 years Malling I, II, IX, and XVI have been compared with French Crab seedling rootstocks. In general, the clonal Malling rootstocks have not given greater tree uniformity or yield. Trees on Malling I average about 2/3 the trunk-size of those on French Crab seedlings and on Malling XVI, which in themselves do not differ significantly. With respect to fruit borne on the tree, French Crab seedlings and Malling XVI have given very similar results in quantity (Table 1) and quality, except that McIntosh on Malling XVI has been a particularly successful combination. Though Malling I has induced slightly higher yields per unit of trunk cross-section than the other rootstocks there is some question about its compatibility and root anchorage when certain varieties are grown on it.

TABLE 1. ACCUMULATED YIELD PER TREE (LB.) INCLUDING 18TH YEAR

	French Crab	Malling XVI	Malling I
McIntosh	2804	3242	2524
R. I. Greening	2120	2226	1533
Delicious	1440	1379	1181
Spy	1007	670	964

On all rootstocks, McIntosh was outstanding in yield, with R.I. Greening, Delicious, and Spy following in that order.

Being fillers, most of the trees on Malling II were removed at 13 years of age. At that time they were slightly larger than the trees on Malling I but not quite as productive for their size.

FIG. 6. Marked difference in vigour in prune-plum crosses. Left, Imperial Epineuse x Italian Prune. Right, Imperial Epineuse x President plum.

PROBLEMS IN FRUIT BREEDING

In fruit breeding there is, as yet, too little information to guide the plant breeder in determining beforehand what the results of a given cross may be. Mostly, the potentialities of a cross, in terms of promising seedlings, can be determined only by making the cross and growing the resulting hybrids to fruiting maturity. The parent varieties themselves are usually of mixed ancestry, and *their* parents, too, unknown. So, variable "children" might well be expected.

Fig. 6 above illustrates the results of two prune-plum crosses. Imperial Epineuse was the seed or mother parent in both cases. The pollen parents were Italian Prune (left) and President plum (right).

With Italian Prune as the pollen parent the resulting seedlings were almost uniformly lacking in vigour, although, in a total population of 237 trees a few were vigorous. Tree habit mostly resembled Italian Prune, being low, spreading, and rather bushy. Also they were susceptible to an unidentified leaf spot. Fruit quality was fair to good.

With President as the pollen parent the seedling trees generally resembled President in growth characters and were vigorous and free from leaf spot. Fruit quality generally was inferior to the Imperial Epineuse x Italian Prune seedlings, and fruit maturity season was later.

In both crosses, therefore, the potent parent, as judged by tree and fruit characters, has been the pollen or male parent.

Imperial Epineuse also was crossed with Coes Golden, Imperial Epineuse again being the seed parent. With both parents possessing high quality of fruit it was hoped that a good percentage of the seedlings would be of high quality. Actually that was the case, and they were mostly freestone too. But colour was quite disappointing, being generally "washy" and nondescript. Tree vigour was fair, better than with Italian Prune as the pollen parent, but the foliage was susceptible to leaf spot.

FIG. 7. Fruit-thinning costs for peaches can be materially reduced by using a hose-tipped stick. It takes a little time to learn the technique.

HOSE THINNING OF PEACHES

When the set of peaches is heavy, thinning becomes both a time-consuming and costly operation. Experiments at this Station over a four-year period have shown that the time required to thin a peach tree can be cut in half when a hose-tipped stick is used to knock off the excess fruit. This has been done with no appreciable adverse effect on tree growth, yield or grade of fruit.

Hose thinning is carried out by the use of a heavy one-inch hose, approximately fifteen inches long, inserted on the end of a stick. By the use of two sticks, one about two feet long and the second four or five feet long, no ladder is needed. However, some growers prefer to use only a short stick, or the hose without a stick, in which case a ladder is required. For the most part, striking into clusters along the branches toward the outside of the tree has given best results. After thinning from the inside of the tree, the workmen should make one round of the tree from the outside, breaking up the clusters that were missed. When the set is very heavy there may be some value in additional hand thinning, particularly of the peaches from the weaker growth and clusters that have been missed with the hose.

The fruits are most easily knocked off when they are of walnut-size. If thinning is started too soon, the peaches will not come off readily, the twigs break off easily and the grower may become discouraged. Also, some varieties are easier to thin than others so that more than one variety should be tried. With hose, as in hand thinning, thoroughness is important. As with many other jobs, skill comes only with practice. It may take a day or more to learn the technique but before discarding the method it should be given a fair trial.

TOMATOES RESISTANT TO LEAF MOULD

Leaf mould is the most important disease of greenhouse tomatoes in Ontario. Ordinarily its ravages are so great that many growers could not profitably produce a fall crop without the use of resistant varieties.

Vetomold was the first mould-resistant tomato developed by the Horticultural Experiment Station. It is still widely grown, not only in Ontario but also in British Columbia, Australia, New Zealand, England, and other countries. In Australia, it is grown as an outdoor staking variety. In Holland it is used as one parent in a hybrid tomato, Single Cross.

V-121, a later development in mould resistance than Vetomold, is now the most widely-grown greenhouse tomato in Ontario. When first introduced V-121 was highly resistant to mould but with the advent of new races of mould it is now susceptible in most greenhouses.

Several lines developed from a cross between Vetomold and another mould-resistant selection, V-473, were tested in commercial greenhouses in 1948. Very favorable reports of two of these varieties (V-4804 above) have been received and they may displace V-121 in popularity.

What of the future? In the past, as resistant varieties became widely planted, new races of the fungus appeared which would attack "resistant" varieties. It is possible that this will continue. Therefore the immediate Station breeding program is to produce new varieties which will have the combined resistance of Vetomold, V-121 and V-473. Besides this we are developing commercial varieties from five different wild tomatoes each of which is immune from all the known races of the mould fungus. Therefore, even if new races of the mould appear, we may hope to be able to supply growers with resistant varieties.

V-35 ASPARAGUS

This variety, now in semi-commercial production and soon to be named, is a selection of Mary Washington. The parent or mother plant of V-35 was one of five high-yielding plants selected at Vineland in 1928 from the early stock of Mary Washington released by the U.S. Department of Agriculture.

Three years' individual yield records were kept of the five original single-plant selections. Then the seed-grown progeny (from restricted pollination with six high-producing male plants), of each of these five selections was compared as to yield and other characters with two commercial strains of Mary Washington. This field test was for five producing years and consisted of randomized plots replicated eight times. On the basis of this test V-35 was considered to be the best of the five Vineland selections, and superior, especially in yield, to Mary Washington itself.

The plant of V-35 is very vigorous, producing tall, stout, heavy top growth with more resistance to the rust disease than other varieties.

The sprouts are large and well formed, and do not open or feather out until quite long. The buds are tight and bracts are close to the stem. A very small percentage of small or cull sprouts are produced. The colour is a slightly paler green than ordinary Mary Washington, but after processing it shows a more attractive colour. The quality is equal to other strains tested.

To date over one hundred and twenty growers have been supplied with liberal samples of V-35, for trial and commercial planting. Several nurseries and seed growers have also been supplied with stock seed. Some of these firms are now producing seed for sale. Many Experiment Stations, in Canada and the United States also have received test samples.

RESEARCH

The Annual Report of the Station for 1942 listed all research projects as of that date. In the period 1943 to 1946, six new projects were undertaken these being listed, with brief explanatory note, in the Station Report (biennial) for 1945 and 1946. 1947 and 1948 projects are:

Project 471. A MICROBIOLOGICAL STUDY UNDER MULCHES AND CLEAN CULTIVATION. (*F. E. Chase and J. R. vanHaarlem*).

This is a co-operative project between the Department of Bacteriology, Ontario Agricultural College, and this Station. The effect of orchard mulching on the soil microflora and their effects on nutrient levels are under investigation.

Project 472. CHEMICAL WEED CONTROL IN VEGETABLE AND SMALL-FRUIT CROPS. (*O. J. Robb and J. F. Brown*)

Various chemicals are being tested as pre- and post-emergence treatments to control weeds in vegetable plantings. They are also being used in established plantings of asparagus and small-fruit crops.

Project 473. FACTORS INFLUENCING EARLINESS IN THE TOMATO. (*E. A. Kerr*)

Tomato varieties differ both in the interval from planting to bloom, and from bloom to maturity. These rates of development are influenced by both genetic and environmental factors. Records are taken of (1) the position of fruits on the plant, (2) the date of hand pollination, (3) the date when the fruits turn colour, and (4) the seed content. Most of the popular field varieties are included in this study. This project has been carried on in the greenhouse.

Project 481. TWO SOD COVERS IN AN APPLE ORCHARD. (*J. R. vanHaarlem and W. H. Upshall*)

Red fescue is being used alone and with alfalfa. Records will be taken on tree growth and production, and on the permanence of the alfalfa as affected by the companion crop of red fescue.

Project 482. FREQUENCY OF MOWING IN A SOD-MULCH APPLE ORCHARD. (*W. H. Upshall and J. R. vanHaarlem*)

The sod is a standard orchard grass mixture with ladino clover. Two and four mowings per year are being compared in their effects on dry weight of mowings and on tree behaviour.

Project 483. SPLITTING OF SWEET CHERRY FRUITS. (*O. A. Bradt and W. H. Upshall*)

The causal factors in the splitting of sweet cherries are under study and treatments designed to reduce splitting are being given.

Project 484. EARLINESS AND YIELD OF STAKED TOMATOES IN RELATION TO SEVERITY OF TOPPING. (*O. J. Robb*)

Tomato plants are topped at the second to fifth cluster in commercial plantings as a means of hastening maturity. This project is to determine (1) the influence of topping on rate of development, and (2) the number of clusters below the point of decapitation which are affected.

FIG. 11. The Haines vineyard east of Jordan, on No. 8 Highway. Several acres of this vineyard have been used since 1929 for the soil-fertilization experiments noted in this Biennial Report of the Station.

SOIL-FERTILIZATION EXPERIMENTS WITH THE CONCORD GRAPE

W. H. Upshall, J. R. vanHaarlem, and C. B. Kelly

Soil-fertilization experiments were conducted at the Haines vineyard about two miles east of Jordan, Ontario, for the period 1929 to 1947 inclusive. For the first eight years severity of pruning also was included in the study. In 1938 a report, final on the pruning phases of the experiment and preliminary on the fertilization responses, was published (9).

PLAN OF EXPERIMENT

The experimental section of the Haines vineyard, approximately 3.4 acres, was planted in 1924. The soil is classified as Vineland Clay Loam—typical grape soil in the Niagara district of Ontario. In the soil-survey records it is described as moderately acid in reaction; medium in organic matter, replaceable potassium, and nitrogen; for the most part low in readily soluble phosphorus; and with heavy, poorly drained subsoil. The Haines vineyard, with an average yield of about 3½ tons per acre, has been consistently above the yield for the district.

Beginning in 1937 and every year thereafter up to the conclusion of the experiment in 1947, all plots were pruned to the number of buds recommended by Partridge (7), i.e., the severity of the pruning in each plot bore a direct relation to the growth made the previous season. Chopped legume hay at two tons per acre was applied to all treated plots in A and C Series in the fall of seven consecutive years, 1936 to 1942. In one-half of A Series and one-half of C Series, surface applications of fertilizer were discontinued in 1935, while in the remaining halves annual fertilization was continued to 1942 (See Fig. 12 and Table 2).

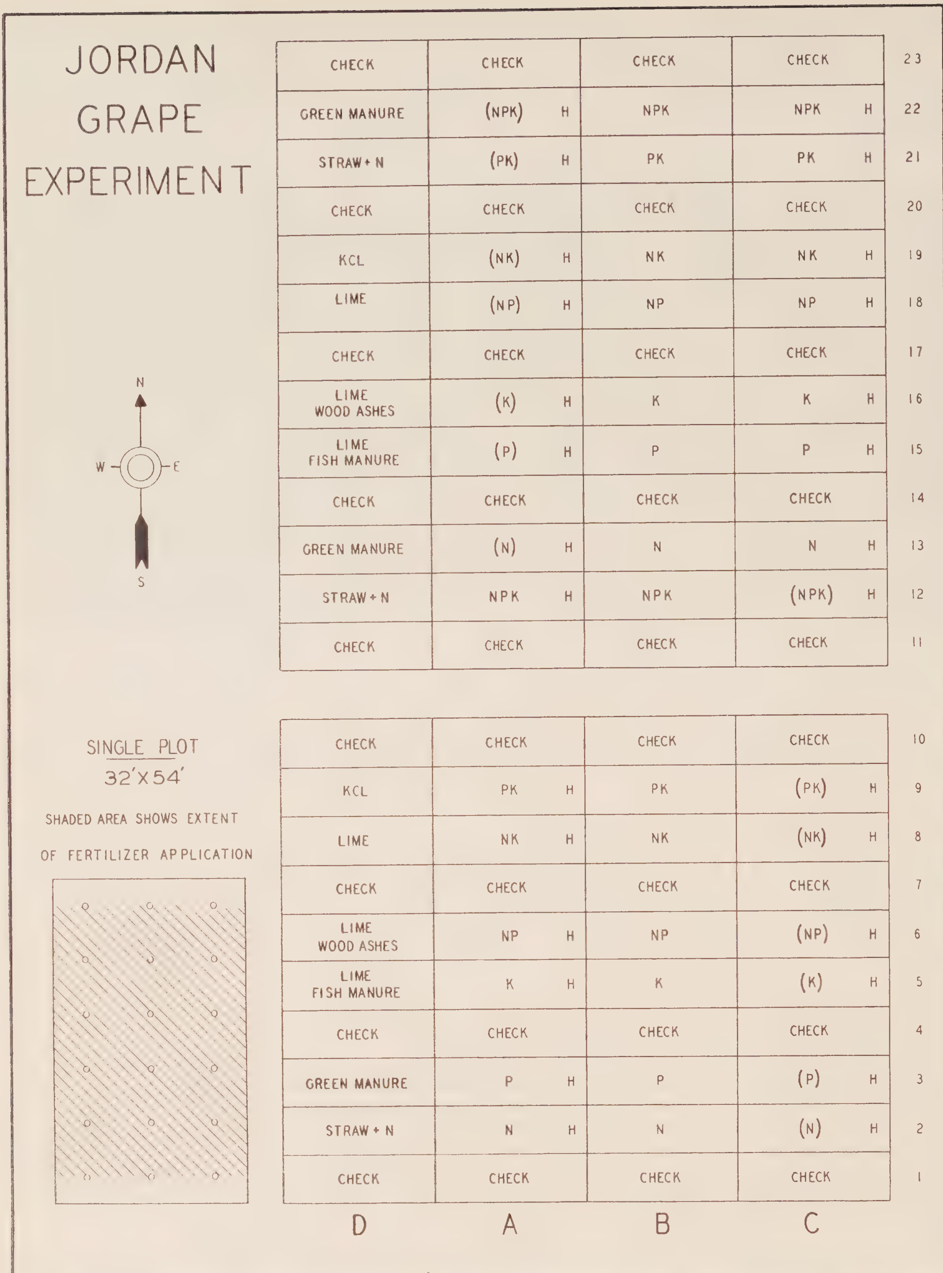

FIG. 12. Diagrammatic plan of series and plot arrangement at the Haines vineyard. Each plot is 32 feet wide (3 rows) and 54 feet long (6 vines) with the rows west to east and vines south to north. A single plot drawn to scale is shown in the lower left corner, the shaded portion representing the fertilized area. This gave a "neutral" zone of 9 feet between treatments and minimized the cultivation transfer of fertilizer from plot to plot. D Series, added one year after the others, had to be placed on the west side of A in order to have vines of comparable age. The letter H denotes hay applications, 2 tons per acre, 1936 to 1942. Bracketed treatments were discontinued in 1935; the other N, P, and K treatments, alone and in combination, were continued until 1942. Check plots received no commercial fertilizer, hay, or straw.

TABLE 2. TOTAL AMOUNTS OF FERTILIZER APPLIED PER ACRE*

	Nitrate of Soda	Super-phosphate	Sulphate of potash	Hay	Straw**	Fish manure	Wood ashes	Muriate of potash	Lime
	lb.	lb.	lb.	tons	tons	lb.	lb.	lb.	lb.
A Series north half									
1929-35	1400	4600	1400						
1939 (deep placement)		1000	500						
1936-42	....	....	....	14					
A Series south half									
1929-42	2800	8900	4650						
1939 (deep placement)		1000	500						
1936-42	....	....	....	14					
B Series									
1929-42	2800	8900	4650						
1939 (deep placement)		1000	500						
C Series north half									
1929-42	2800	8900	4650						
1939 (deep placement)		1000	500						
1936-42	....	....	....	14					
C Series south half									
1929-35	1400	4600	1400						
1939 (deep placement)		1000	500						
1936-42	....	....	....	14					
D Series†									
1930-34	....	....	....	....	10				
1937-41	....	....	....	....	10				
1930-42	....	....	....	....	....	....	....	4500	
1934	....	....	....	....	....	....	....	....	1500
1936-41	....	....	....	....	....	3000	....	....	
1936-42	....	....	....	....	....	....	2800		

*See Figure 12 for individual plot treatments.

**Plus 400 pounds nitrate of soda per acre from 1930 to 1934, and from 1937 to 1939; and 300 pounds per acre 1940 to 1941. Half of the quantity was applied with the straw in the fall, the balance in the spring.

†A green-manure crop was sown on three unfertilized plots (D3, 13, and 22) from 1931 to 1943.

Except for the deep placement of minerals in 1939, all fertilizer and organic additions were applied on the surface and immediately disked or plowed in. In the fall of 1939 sulphate of potash and superphosphate were applied at a depth of nine inches, about 30 inches on each side of the row, using a subsoiler with fertilizer attachment. As in surface applications, the fertilizer was applied only up to, not beyond, the end vines of each plot (See Fig. 12). However, all plots in A, B, and C Series, both fertilized and unfertilized, were subsoiled at this time to a depth of about 12 inches.

The green-manure crop, usually millet, was planted as soon as possible after general cultivation ceased, usually about the third week in July. Being in the same rows as the straw applications it was incorporated with the soil in late fall. In 1935 and 1936 the summer cover was a failure due to drought, and a winter cover of rye was used. This was disked down in the spring but not as early or as thoroughly as was desirable. With

the exception of the three green-manure plots in D Series (millet), the cover was regularly a rather sparse growth of weeds.

Weight of prunings on the plot basis was taken every year except the second and third. Yields were recorded annually for each vine. A few vines died and others were injured by attacks of dead arm disease. Where vines were missing, were recent replacements, or severely injured, the average yield of the normal vines of the plot was substituted. During the course of the experiments the number of substitutions was less than ten per cent of the total.

Every third plot was left unfertilized (check) and its yield was used as a base on which to estimate the increase or decrease in growth and yield due to treatment. The "normal" for the treated plots was considered as 2/3 of the adjacent check plot plus 1/3 of the distant one.

RESULTS

Fertilization to 1935 Compared to Fertilization to 1942.

Using the yield figures of A and C Series from 1937 to 1943, it is evident (Table 3) that the continued fertilization, from 1936 to 1942, did not result in an appreciable increase over the plots for which fertilization was discontinued in 1935. In the south sections the continued fertilization had a slight edge but it was the reverse in the north sections. The difference in total is statistically without significance.

TABLE 3. FERTILIZATION FROM 1929 TO 1935, AND 1929 TO 1942, COMPARED AS TO YIELD

	Fertilized 1929-35 Total Yield 1937-43	Fertilized 1929-42 Total Yield 1937-43
	lb.	lb.
South end	15066 (7)	16612 (7)
North end	15438 (7)	14486 (7)
Total	30504 (14)	31098 (14)

( ) number of plots

Effect of Applications of Chopped Legume Hay on Yield, 1937 to 1943.

Chopped hay was applied in the fall in A and C Series, fertilized plots only, from 1936 to 1942 inclusive. From 1937 to 1943 the total yield of the 14 plots with hay was 31089 pounds; without hay (14 plots) 29647 pounds—an almost significant gain of 4.9 per cent resulting from the hay applications. In the 7-year period a total of 14 tons of hay had been applied to these plots—equivalent in organic matter to over 40 tons of farm manure. A greater response might have been expected. The plots receiving nitrogen applications did not show any greater response from the hay than did the non-nitrogen plots, thus a nitrogen deficiency resulting from the decomposition of the hay would not explain the comparatively low return from hay applications.

Effects of N, P, and K Fertilizers, Alone and in Combination.

The most marked response from commercial fertilizers was obtained from phosphate on weed growth. This effect was in evidence every year. Plots which were receiving phosphate could be identified by the better

stand and more profuse growth of weeds. On non-phosphate plots the dry matter obtained from the top growth of weeds would not average more than three-quarters of a ton per acre per year. At a conservative estimate the phosphate plots averaged twice as much top growth as the other plots.

In view of the fact that the treatments of later years, viz., hay additions and cessation of fertilization on certain portions of A, B, and C Series, produced comparatively small effects, all plots were put in their original treatment-classification for the analysis of results with N, P, and K fertilizers (Table 4). Nitrogen alone was ineffective but in combinations with P and K it seemed to be of some value. Of the three elements, phosphate seems to have given the most significant response, and this may be due in large measure to its stimulus to weed growth and the indirect effect of these additions to the sum total of soil organic-matter. Potash has been more variable in its effects and the differences, except in the phosphate-potash combinations, lacks statistical significance. Considering that the quantities of fertilizers applied have been large, and that the soil is naturally low in readily available phosphate, a greater response to fertilization might have been expected.

TABLE 4. ACTUAL AND NORMAL* YIELDS (LB.) OF SIX FERTILIZED PLOTS FOR EACH TREATMENT, 1930 TO 1947, A, B, AND C SERIES

	N	P	K	NP	NK	PK	NPK
Actual	31120	34347	35270	35833	34955	34535	33654
Normal	31741	32425	33055	33210	32456	30985	29706
% difference from normal	—2.0	+5.9†	+6.7	+7.9†	+7.7	+11.1†	+13.3†

* as calculated from adjacent untreated plots. † a significant increase.

Effects of Straw, Green-manure Crops, Lime, Wood Ashes, and Fish Manure.

Fall applications of straw, 2 tons per acre, plus 400 pounds nitrate of soda (half in fall and half in spring) gave marked increases. There was a lag of a year or two before straw applications began to appreciably affect the yield, and again before the yield increases tapered off after applications ceased (Fig. 13 and Table 5). After continuous annual applications, 1930 to 1934, cane growth was about 40 per cent greater than in the adjacent untreated plots. It seemed that it might soon become excessive, perhaps to the detriment of fruit production. Consequently, straw applications were omitted in 1935 and 1936 with a resultant levelling off in yields in 1937 and 1938. With straw applications resumed in 1937, yield increases over checks began to rise in 1939, only to fall again three years after the termination of the applications in the autumn of 1941. It would appear that straw should be applied at least every second year for maximum benefit.

A summer green-manure crop was planted on three plots in D Series continuously from 1931 to 1943. However, in 1935 and 1936 drought kept the seed from germinating, and winter rye was sown in the fall as a substitute. Unfortunately it was not knocked down and incorporated in the soil quickly enough in either of the following years and, as a result, there was a set-back to growth and yield (Fig. 13). In 1937 and up to 1943, the time of cessation of their use, summer covers grew fairly

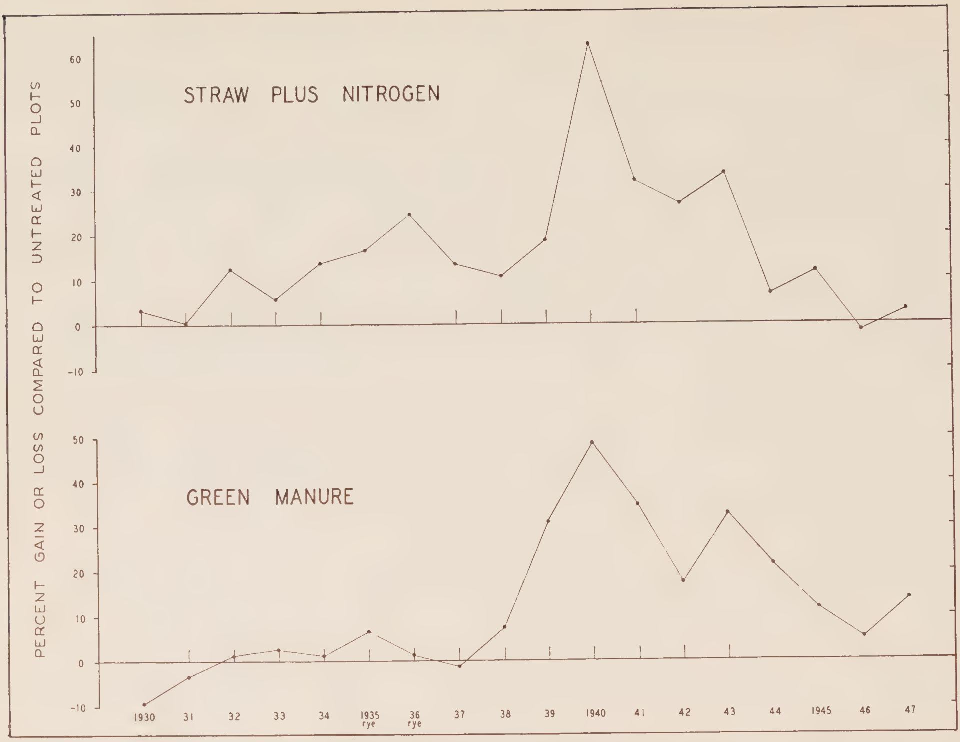

FIG. 13. Effect of straw plus nitrogen, and green-manure crops on the yield of Concord grapes, treatments being given in the years marked by a short vertical line.

TABLE 5. PERCENTAGE INCREASE OR DECREASE IN YIELD FROM STRAW + NITROGEN, AND GREEN-MANURE TREATMENT (D SERIES)

Year	Straw + N	Green manure
1930	+ 3.2*	— 9.5
1931	+ 0.4*	— 3.3†
1932	+12.4*	+ 1.1†
1933	+ 5.7*	+ 2.9†
1934	+13.8*	+ 1.1†
1935	+16.5	+ 6.6†
1936	+24.3	+ 1.3†R
1937	+13.2*	— 1.2†R
1938	+10.5*	+ 7.1†
1939	+18.7*	+30.8†
1940	+62.2*	+48.1†
1941	+31.7	+34.5†
1942	+26.7	+17.2†
1943	+33.3	+32.5†
1944	+ 6.6	+21.3
1945	+11.7	+11.5
1946	— 1.9	+ 5.0
1947	+ 2.9	+13.6

* straw (+ N) applied in the fall. † green-manure crop used.
R rye left standing too long in the spring.

well and gave appreciable yield increases (Table 5). After 1943 the grape yields began to taper off. The summer covers were usually millet, occasionally buckwheat, both sown in the latter part of July. No fertilizer was applied to these plots at any time during the course of the experiments.

Dry matter per plot did not average more than 1½ tons per acre per year (estimate). With phosphate additions, it probably would have been possible to increase this figure by 50 per cent, judged by weed response.

Muriate of potash in D Series (Table 6) gave similar increases to sulphate of potash in A, B, and C Series (Table 4). Hydrated lime by itself seemed to give a boost to yield (Table 7), but when followed with annual applications of wood ashes for seven years and, on other plots, fish manure for six years, the seeming favorable response from lime was lost. This creates some doubt concerning the value of lime. At least it may be said that wood ashes and fish manure had no value in this vineyard.

TABLE 6. ACTUAL AND NORMAL YIELDS FOR THREE TREATMENTS IN D SERIES, 1930 TO 1947

	Straw + N	Green-manure crop	Muriate of potash
	lb.	lb.	lb.
Actual	17114	16775	12050
Normal	14969	15130	11107
% increase	14.4	10.9	8.5

TABLE 7. ACTUAL AND NORMAL YIELDS FOR THREE TREATMENTS* IN D SERIES, 1935 TO 1947

	Lime	Lime Wood Ashes	Lime Fish manure
	lb.	lb.	lb.
Actual	7998	7806	8027
Normal	7002	7443	7766
% increase	14.2	4.9	3.4

* Hydrated lime, 1500 lb. per acre, was applied in the spring of 1935. Previous to this time, these plots were in a nitrogen time-of-application test. Wood ashes were applied from 1936 to 1942 inclusive, and fish manure, 1936 to 1941.

Effect of Seasonal Conditions on Growth and Yield.

There was very marked fluctuation in both growth and yield from season to season in the Haines vineyard. This variation is shown in Fig. 14 for B Series for the period 1937 to 1947. During this interval the plots were pruned with relation to the growth made the previous summer, using weight of prunings as an index of the optimum number of buds to be left. In most years, the crop of fruit was determined primarily by the growth made the previous year, i.e., the more buds which could reasonably be left at pruning time the better the chances for a large crop that season. However, there were some seasons, such as 1938, so unfavorable for fruit development that the crop fell much below expectations. Conversely, the seasons of 1937 and 1939 were unusually favorable for fruit development. It appears that fruit production was affected more by seasonal weather conditions than was growth, for there was a greater relative range between high and low yields than between high and low pruning-weights—75 per cent spread as compared with 58 per cent.

The figures used in the construction of Fig. 14 are presented also in tabular form (Table 8) with the ratios between yield and prunings. These ratio figures show a range of 9.4 to 5.3 and an average of 6.7. In a normal season the ratio would be close to the average; in a favorable season for fruit development it would be higher, and in an unfavorable

one, lower. However, if pruned according to vigour of vine, which is the recommended procedure, the current season's crop of fruit is determined to a large extent by the growth of vine made the previous year.

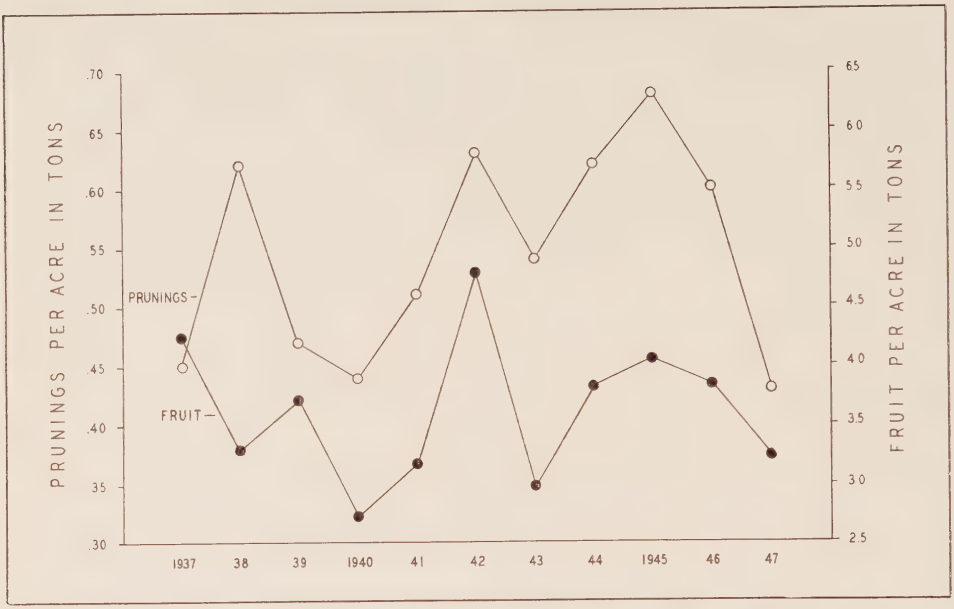

FIG. 14. Seasonal variation in weight of prunings and of fruit (B Series, Haines vineyard) and their relation one to the other.

TABLE 8. SEASONAL VARIATIONS IN WEIGHT OF PRUNINGS AND YIELD AND THEIR RATIOS (B SERIES)

Year	Prunings per acre*	Yield per acre	Ratio†
	tons	tons	
1937	.45	4.25	9.4
1938	.62	3.30	5.3
1939	.47	3.71	7.9
1940	.44	2.73	6.2
1941	.51	3.17	6.2
1942	.63	4.78	7.6
1943	.54	2.98	5.5
1944	.62	3.82	6.2
1945	.68	4.05	6.0
1946	.60	3.84	6.4
1947	.43	3.23	7.5
Average	.54	3.62	6.7

* one- and two-year wood only. † Ratio of yield to prunings.

Falling Yields as Shown in a Comparison of the First Nine Years with the Second Nine Years.

In this long-time fertilizer experiment with its continuous yield records throughout, an opportunity was afforded to measure yield trends. In A, B, and C Series, differential fertilization treatments were commenced in 1929, but D Series was first included in 1930. If 1930 is taken as the first year, 18 years' yield records are available.

When divided into two nine-year periods, it is apparent that the yields have fallen off in the second period in B, C, and D Series (Tables 9 and 10). A Series did not follow the same trend because the yield had been held down in the first period by excessive pruning (30 buds per vine). Not only did this pruning reduce yields but it also built up vigour in the vines, which carried over into the second period with the highest yields of all series. Contrary to A Series, C Series was underpruned (54 buds, 1944 to 1946) and some plots had been weakened considerably before they went into the second period.

B and D Series had more or less normal pruning treatment throughout the 18-year period. The untreated plots in these series, having no fertilizer additions and only a poor weed-cover from August onwards each season, showed a yield decrease of 7.4 and 8.2 per cent in the second nine-year period. The liberal applications of commercial fertilizer to the treated plots of B Series, and of organic and inorganic additions to D Series, had failed to completely arrest the falling yields although the drop was of minor degree, 2.5 and 1.5 per cent. These falling yields are very largely a result of a decline in the physical and chemical condition of the soil. Only to a minor extent could it have been due to the increasing prevalence of the dead arm disease, for the yields given in Tables 9 and 10 were adjusted for diseased and missing vines.

TABLE 9. YIELDS* OF UNFERTILIZED PLOTS BY PERIODS

Series	1930 to 1938	1939 to 1947	% change
A	3.47	3.64	+ 4.9
B	3.76	3.48	— 7.4
C	3.95	3.50	—11.4
D	3.77	3.46	— 8.2

* tons per acre, averages of 9 plots in each series.

TABLE 10. YIELDS* OF FERTILIZED PLOTS BY PERIODS

Series	1930 to 1938	1939 to 1947	% change
A	3.64	4.14	+13.7
B	3.99	3.89	— 2.5
C	4.13	3.98	— 3.6
D	4.00	3.94	— 1.5

* tons per acre, averages of 14 plots in each series.

Effects of Fertilization on Soil Nutrients.

Soil samples, surface (0-6 inches) and subsurface (6-12 inches) were taken from A, B, and C Series in the spring of 1929, spring of 1934, fall of 1936, and spring of 1948. Samples from D Series were taken at the same time except that the first one was in 1930. Results of the early samplings have already been reported (9). In 1936 it was obvious that phosphate and potash applications were appreciably increasing the readily available supply of each one in the surface soil but not in the subsurface soil. By 1948 the methods of soil analysis had changed to such an extent that comparison with the early figures is not justified. Accordingly a new analysis of the 1936 samples was undertaken.

Readily Available Phosphorus—No surface applications of commercial fertilizer were made after 1942, and on some plots (see Table 2), not after 1935.

Analyses of the 1936 and 1948 samples (Table 11) show a fairly consistent tendency for the surface soil to decrease in readily available phosphorus, and for the subsurface soil to increase. As a consequence of the contrasting trends in the two layers of soil, by 1948 the subsurface soil was generally higher in readily available phosphate than the surface soil, a reversal of their 1936 positions. These points are illustrated by the data for D Series but are also true for the other series.

TABLE 11. READILY AVAILABLE PHOSPHORUS* IN SOLUTION IN D SERIES

Treatment	Number of plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
		p.p.m.	p.p.m.	p.p.m.	p.p.m.
Straw + N	3	8	5	3	8
Green manure	3	8	5	4	13
Lime	2	10	6	6	14
Lime — wood ashes	2	8	10	6	10
Lime — fish manure	2	12	10	6	18
Muriate of potash	2	6	6	2	12
Untreated	9	8	7	4	11

* Modified Thornton method.

Half of A and of C Series had no commercial fertilizer after 1935. The other halves were fertilized until 1942 receiving thereby an additional 4300 pounds per acre of superphosphate in the latter period. In 1948 the readily available phosphate in the surface soil of these plots was double the quantity found in the plots where fertilization had ceased in 1935 (Table 12) but the differences in the subsurface soil were insignificant, both being about the level found in unfertilized plots. In 1936 the surface soil of the phosphate plots was considerably higher in readily available phosphate than the surface soil of untreated plots. By 1948, however, with no phosphate applications for 13 years, the phosphate plots had completely lost their lead over the unfertilized plots. It appears therefore that, in this soil, the residual effects of heavy phosphate fertilization on the level of readily available phosphorus remain for only a few years.

TABLE 12. READILY AVAILABLE PHOSPHORUS IN SOLUTION IN A AND C SERIES IN 1948

Treatment	Number of plots	Surface	Subsurface
		p.p.m.	p.p.m.
Phosphate 1929 to 1942	8	12.	12.
Phosphate 1929 to 1935	8	6.	12.
Untreated	27	6.	12.

Replaceable Potassium—By annual additions of sulphate of potash from 1929 to 1936 (muriate in D Series, 1930 to 1936) the replaceable potassium was nearly doubled in the surface soil, but there was no increase in the subsurface soil (Table 13). On the plots receiving potash to 1942 a further increase would be expected, but if this was the case the differences were reduced to insignificant proportions by 1948. The data for D Series, rather than for the other series, are presented, because there were fewer changes of treatment in the latter part of the experiment, but the results appear to be very similar. As a means of increasing the

replaceable supply of potassium in the soil there seems to be little to choose between the sulphate and the muriate.

No treatment in D Series has been effective in increasing the replaceable potassium in the subsurface soil. Of the several treatments in D Series aside from muriate of potash, straw + N is the only one showing a consistent increase in replaceable potassium in the surface soil (1948 sampling only).

TABLE 13. N/$_1$ NaCl REPLACEABLE POTASSIUM* IN SOLUTION

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
		p.p.m.	p.p.m.	p.p.m.	p.p.m.
Straw + N	3	48	72	44	48
Green manure	3	56	52	52	40
Lime	2	40	40	40	40
Lime — wood ashes	2	40	28	40	20
Lime — fish manure	2	48	60	44	28
Muriate of potash	2	88	100	48	28
Untreated	9	48	52	44	32

* Thornton method.

It appears possible to only temporarily raise the level of replaceable potassium in this soil. By 1936 the quantity had been doubled in the surface soil through surface applications but, without further additions, by 1948 these plots were only on a par with the unfertilized plots (Table 14). Where fertilization was continued to 1942, the supply was less than double that of the untreated plots which indicates that here too the potassium was taking a non-replaceable form. In the subsurface soil, the untreated and short-term fertilization plots have, in 1948, the same amounts of replaceable potassium; but in the samples from the long-term fertilization there is some indication of higher levels, a suggestion that the fertilizer is gradually getting down to the second layer of soil.

TABLE 14. N/$_1$ NaCl REPLACEABLE POTASSIUM IN SOLUTION IN A AND C SERIES IN 1948

Treatment	Number of Plots	Surface	Subsurface
		p.p.m.	p.p.m.
Potash 1929 to 1942	8	84	52
Potash 1929 to 1935	8	48	36
Untreated	27	48	36

Water-soluble Calcium—The water-soluble calcium in the soil has not been changed appreciably by any fertilizer treatment even though calcium is a constituent of superphosphate and lime. (Table 15.) In 1936 there were no consistent differences in calcium content between the two soil layers. However, from 1936 to 1948 there was a consistent increase in the subsurface soil, resulting in regularly higher readings in 1948.

Acidity—In both surface and subsurface samples of all plots there has been a definite trend towards a reduction in acidity (increase in pH value) between 1936 and 1948 (Tables 16 and 17). The differences in pH between surface and subsurface at both samplings, are small and of no consequence. None of the commercial fertilizers has had any appreciable effect in changing the acidity. As already reported (9), hydrated lime

at 1500 pounds per acre in the spring of 1934 did change the acidity at that time, but by 1948 these plots were almost as acid as the untreated plots. The two treatments, straw + N, and green-manure crops, seem to have had an accelerating effect in the change to a less acid condition in both surface and subsurface soil layers.

TABLE 15. WATER-SOLUBLE CALCIUM* IN SOLUTION IN A, B, AND C SERIES

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
		p.p.m.	p.p.m.	p.p.m.	p.p.m.
N	6	171	171	166	183
P	6	175	171	173	192
K	6	146	142	158	171
NP	6	154	162	150	171
NK	6	145	150	170	195
PK	6	165	171	182	192
NPK	6	167	167	186	200
Untreated	27	164	162	177	192

* Spurway method.

TABLE 16. pH VALUES* IN SOILS OF A, B AND C SERIES

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
N	6	5.8	6.1	5.8	5.9
P	6	5.8	6.0	5.7	6.0
K	6	5.6	6.0	5.5	5.9
NP	6	5.7	6.1	5.7	5.9
NK	6	5.4	5.8	5.5	5.7
PK	6	5.5	5.9	5.4	5.7
NPK	6	5.3	5.7	5.3	5.7
Untreated	27	5.7	5.9	5.6	5.9

* Beckman pH meter.

TABLE 17. pH VALUES IN SOILS OF D SERIES

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
Straw + N	3	5.7	6.3	5.6	6.1
Green manure	3	5.6	6.2	5.5	6.1
Lime	2	6.2	6.3	5.9	6.1
Lime — wood ashes	2	6.1	6.4	5.8	6.2
Lime — fish manure	2	6.2	6.2	5.9	6.0
Muriate of potash	2	5.4	6.1	5.4	6.0
Untreated	9	5.7	6.1	5.6	6.0

Organic Matter—The loss in organic matter in both surface and subsurface soils was very considerable in the period 1936 to 1948 (Tables 18 and 19). The 1936 figures for the NPK, straw + N, and green-manure plots suggest that the organic matter was being fairly well maintained at that time by these treatments, at least in the surface soil. However, the termination of the treatments at various times thereafter has permitted the organic content of the soil to drop appreciably. In all series, the relative drop in organic matter has been greater in the subsurface soil than in the surface soil. For A, B, and C Series, the surface soils under the various treatments decreased 10 to 24 per cent in organic content from 1936 to 1948, while in that same period the subsurface soils decreased 31 to 47 per cent. The likely explanation is that the crop residues were being concentrated in the surface soil.

TABLE 18. ORGANIC MATTER* IN A, B, AND C SERIES

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
		%	%	%	%
N	6	3.47	2.69	1.95	1.13
P	6	3.54	2.98	2.16	1.15
K	6	3.07	2.60	1.74	1.15
NP	6	3.08	2.69	1.88	1.20
NK	6	3.43	2.95	2.41	1.27
PK	6	3.41	3.06	1.81	1.21
NPK	6	4.02	3.43	2.19	1.52
Untreated	27	3.38	2.58	2.02	1.21

* Thomas and Williams method (Proc. Soil Sci. Amer. Vol. 1, 1936).

TABLE 19. ORGANIC MATTER IN D SERIES

Treatment	Number of Plots	Surface 1936	Surface 1948	Subsurface 1936	Subsurface 1948
		%	%	%	%
Straw + N	3	3.89	3.34	3.34	1.94
Green-manure	3	4.00	3.37	2.49	1.37
Lime	2	3.44	2.77	2.32	1.37
Lime — wood ashes	2	2.90	2.88	2.10	1.19
Lime — fish manure	2	3.39	2.77	2.52	1.74
Muriate of potash	2	2.72	2.09	1.58	0.90
Untreated	9	3.25	2.74	2.57	1.36

DISCUSSION

In this experiment there was a comparatively small response from commercial fertilizer. The yield increases obtained were insufficient to pay for the large amounts of fertilizer applied. Nitrogen alone has been ineffective, a result similar to that reported by Cooper and Vaile (1) for a silt-loam soil in an Arkansas vineyard. Most other workers in the United States—Partridge and Veatch (8) of Michigan, Gourley (4) of Ohio, Gladwin (3) of New York, and Faurot (2) of Missouri—report moderate to high increases in yield from applications of nitrogen. In the Haines vineyard, nitrogen seems to have been slightly beneficial when combined with phosphate, potash, or a combination of the two. The effect of phosphate has probably been largely an indirect one in stimulating the growth of the green-manure crop of weeds.

A similar effect would likely have been in evidence on green-manure crops such as millet and buckwheat. Both Gladwin (3) and Faurot (2) report such increases from phosphate, but they failed to get any appreciable response in grape yields. Judging from the favorable effects of green manuring on the plots in D Series, however, one would be tempted to predict that phosphate fertilization would have resulted in further yield increases. This point warrants further investigation.

Straw applications were much more effective in increasing growth and yield than were the same quantities of chopped legume hay. The reason for this difference is not obvious although straw is more bulky in relation to its dry weight than hay and might have a greater immediate effect on the physical condition of the soil. Faurot (2) of Missouri reports a very marked growth increase from a straw mulch but it was not followed by a yield increase, explained at least in part by greater prevalence of black rot as a result of the heavy foliage in this plot. A non-compact type

of soil appears to be important for high yields in grapes. Working in this vineyard (Haines), Knight (5) reported highest yields from plots having high sand-content in the soil. This is in agreement with Oskamp's findings (6).

Apparently it is not possible with this soil to permanently raise the levels of readily available phosphorus and replaceable potassium by heavy surface applications of superphosphate and potash. The minerals supplied do not get down below the surface soil or, if they do, they are very quickly changed to an unavailable form. Even in the surface soil the increased supply of available phosphorus and replaceable potassium is transitory. It seems, therefore, that deep placement is required where the vines show deficiency symptoms. Lacking deep placement, it would seem wise to fertilize with the express purpose of growing a maximum amount of green manure. This addition promises to be the cheapest one that the grower can find.

The general trend to falling yields in the Haines vineyard is disturbing. Basically a good grape soil producing excellent crops, it is nevertheless showing the effects of neglect in maintaining the organic-matter content of the soil. With reduction in the organic content there is undoubtedly a loss in permeability to air and water. It is obvious that the soil is becoming more compact, especially noticeable in the areas of heaviest soil.

In spite of losses in organic content of 10 to 47 per cent in the 13-year period, 1936 to 1948, the yields in the latter half of the experiment have not fallen off badly, only 7 to 8 per cent in unfertilized plots. Perhaps the heavy annual pruning required by the grape tends to delay the onset of a devitalized condition. Nevertheless, yields are falling and growers with similar conditions should give some thought to arresting the loss of organic matter, and the degradation in the physical condition of their soils. By seeding the green-manure crop as early as possible, and feeding it to get maximum growth, much can be done to maintain grape yields at constant and profitable levels.

SUMMARY

This paper gives a final summary of soil-fertilization experiments in the Haines vineyard near Jordan, Ontario, covering the period 1929 to 1947. The following conclusions may be drawn:

1. Comparing the second 9-year period with the first 9-year period, yields during the second period dropped about 8 per cent in unfertilized plots and about 2 per cent in fertilized plots.

2. Nitrate of soda alone was ineffective; superphosphate stimulated weed growth considerably and gave the best response in yield of fruit; sulphate and muriate of potash were of slightly less value than superphosphate. The greatest increase was from the NPK combination, 13.3 per cent, a small increase considering the cost of the treatment.

3. Straw plus nitrate of soda, and green-manure crops grown on the plots gave marked responses in growth and yield. Chopped legume hay was not as effective as straw plus nitrate.

4. Applications of lime, wood ashes, and fish manure were of doubtful value.

5. Except when affected by unusual weather in the current season, the growth of cane made the previous season determined to a large extent the crop in any given season, provided the vines were pruned in relation to their vigour.

6. Heavy surface applications of superphosphate and potash temporarily raised the level of readily available phosphorus and replaceable potassium in the surface soil, not in the subsurface soil (6 to 12 inches). The water-soluble calcium was not appreciably changed by the treatments.

7. From 1936 to 1948 there was a definite trend toward less acidity in both surface and subsurface samples, irrespective of treatment. Lime applied in 1934 changed the acidity at that time but its effect had very largely disappeared by 1948.

8. Where there were no organic additions except weeds and grape leaves, the organic matter dropped 10 to 24 per cent in the surface soils, and 31 to 47 per cent in the subsurface soils, in the period 1936 to 1948.

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SOME EFFECTS ON THE SOIL THROUGH SHORTENING THE ANNUAL CULTIVATION PERIOD IN AN APPLE ORCHARD

G. H. Dickson and W. H. Upshall

Maintenance of physical structure (and fertility) of orchard soils is a basic horticultural problem. It is now established that sods correct the physical conditions of degraded or over-cultivated soils. However, sods may pose other problems for the grower, such as nitrogen and water deficiencies, and pest control. *Reduced* cultivation may provide a partial answer—a short cultivation-period which, to some extent, combines the desirable effects of both sod and clean cultivation.

This question has yet to be answered in its entirety. However, under conditions in one apple orchard (McIntosh, Baldwin, and Northern Spy), at the Horticultural Experiment Station, the normal clean cultivation to mid-July seems to be quite unnecessary. Cultivation for only a few weeks—average to May 19—has given, over a 20-year period, nearly as much fruit (Table 20) as the normal cultivation to July 15. Also, the minimum-cultivation plots produced fruit of higher colour and better storage qualities for all three varieties; and with McIntosh, its tendency to early dropping was materially reduced (1).

TABLE 20. YIELD OF APPLES* UNDER NORMAL (TO MID-JULY) AND MINIMUM CULTIVATION (TO MID-MAY)

Variety	Normal cultivation	Minimum cultivation
McIntosh	4141(21)†	4559(19)
Baldwin	2123(24)	2080(18)
Northern Spy	4092(18)	3621(21)
Average	3452	3420

* pounds per tree 1928 to 1947 for McIntosh and Northern Spy, 1928 to 1944 for Baldwin.

† the number of trees in each group is given within the bracket.

This 6-acre orchard was planted in 1921, differential cultivation treatments being commenced in 1928 and terminated in 1947. The soil is classified as Vineland Fine Sandy Loam. Analyses show an average of 57% sand, 7% clay, and 36% silt in the topsoil in this orchard.

Each year, cultivation commenced as soon as the soil was dry enough and was repeated as often as necessary to keep the weeds down. Two plots received a minimum of cultivation, just sufficient to prepare a good seed bed, and two were cultivated to about July 15. Green-manure crops, varying in kind from year to year, were sown on the dates cultivation ceased. When buckwheat was used, a second crop was sown on the minimum-cultivation plots at the same time as the normal-cultivation plots were seeded.

In order to measure the differences in chemical and physical qualities of the soil under the two treatments, soil samples (0 to 6 inches) were taken in early April, 1948. The results of these analyses* are summarized in Table 21.

* Courtesy, Department of Soils, O.A.C., Guelph.

TABLE 21. SUMMARY OF ANALYSES* OF SOIL SAMPLES TAKEN IN APRIL 1948, AT THE CONCLUSION OF A 20-YEAR EXPERIMENT ON INTENSITY OF CULTIVATION

	Normal cultivation (to mid-July)	Minimum cultivation (to mid-May)
Suspension percentage	19.6	18.4
Dispersion ratio	45.4	42.7
% non-capillary porosity	6.1	8.6
% total pore-space	50.5	53.5
% organic matter	2.6	2.8
Replaceable potassium (p.p.m. in solution)	140.	180.

* Each figure represents an average of 10 individual samples taken systematically throughout the plots, except for organic matter and potassium where 4 composite samples were used for each treatment. With the exception of organic matter, all differences are statistically significant.

Soil structure bears a direct relation to the aggregation of the soil particles. The suspension percentage and dispersion ratios are indirect measures of aggregation and consequently the *higher* these figures are, the *less* the aggregation of particles and the poorer the soil structure. The figures indicate therefore that the extra two months' cultivation (normal) has been damaging to the structure of the soil making it less easily workable, less absorptive of water, and more subject to erosion.

Non-capillary porosity is a measure of the incidence of large pores which do not readily hold water by capillarity. They are largely the channels for air movement throughout the soil and are instrumental in speeding percolation of water into the soil during a rain. The greatest difference between these two cultivation treatments lies in this character, the minimum-cultivation samples having 41% more non-capillary pore-space than the normal-cultivation samples. The figures on total pore-space indicate that the major difference between the cultivation treatments is in non-capillary rather than capillary pore-space.

The differences in organic matter between treatments are small and not quite significant statistically. This is not surprising for it is known that it is difficult to raise the organic-matter level above that characteristic of the soil type. The differences in acidity (pH), nitrates, readily available phosphorus and water-soluble calcium were small, variable, and of no significance; but the differences in replaceable potassium were appreciable and significant. On a soil such as this, bordering naturally on potassium deficiency, this is an important finding.

SUMMARY

A 20-year comparison between normal (to mid-July) and minimum cultivation (to mid-May) in an apple orchard on a fine sandy-loam soil shows that, in addition to more economical yields of fruit, the soil under the minimum-cultivation treatment has better structure, more replaceable potassium, and probably more organic matter, than the soil under the normal-cultivation treatment.

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FIG. 15. A view of part of the "organic-matter" plots discussed in this report. Annual green-manure plots on the left, perennial plots on the right.

SOME CHANGES IN A SOIL AFTER TEN YEARS OF SOD, GREEN-MANURE, AND FERTILIZATION TREATMENTS.

O. A. Bradt, W. H. Upshall, and J. R. vanHaarlem

The maintenance of organic matter in fruit plantations is an important problem. Depletion of this vital constituent of our orchard soils render them more subject to erosion and less receptive to rainfall. A complex experiment was laid down at the Horticultural Experiment Station in the spring of 1936 with the primary objective of measuring increases or decreases in the organic content of the soil resulting from various sod- and annual-crop treatments, both with and without fertilization. A preliminary paper, dealing mainly with dry weight of top growth, was published in the 1943-44 Report of this Station. The present paper deals mainly with the changes which took place in the soil from 1936 to the spring of 1946.

MATERIALS AND METHODS

This experiment is laid out on soil classified as Vineland Fine Sandy Loam. Mechanical analyses of the topsoil show an average of 52% sand, 9.5% clay, and 38.5% silt. This sandy-loam soil, on a clay subsoil, varies in depth from three to six feet. The plots are in open field, not in orchard, and no fruit or vegetable crop is being grown thereon.

Chemical analyses methods used for these soil samples were as follows: Total nitrogen by the Official Kjeldahl method; phosphorus by

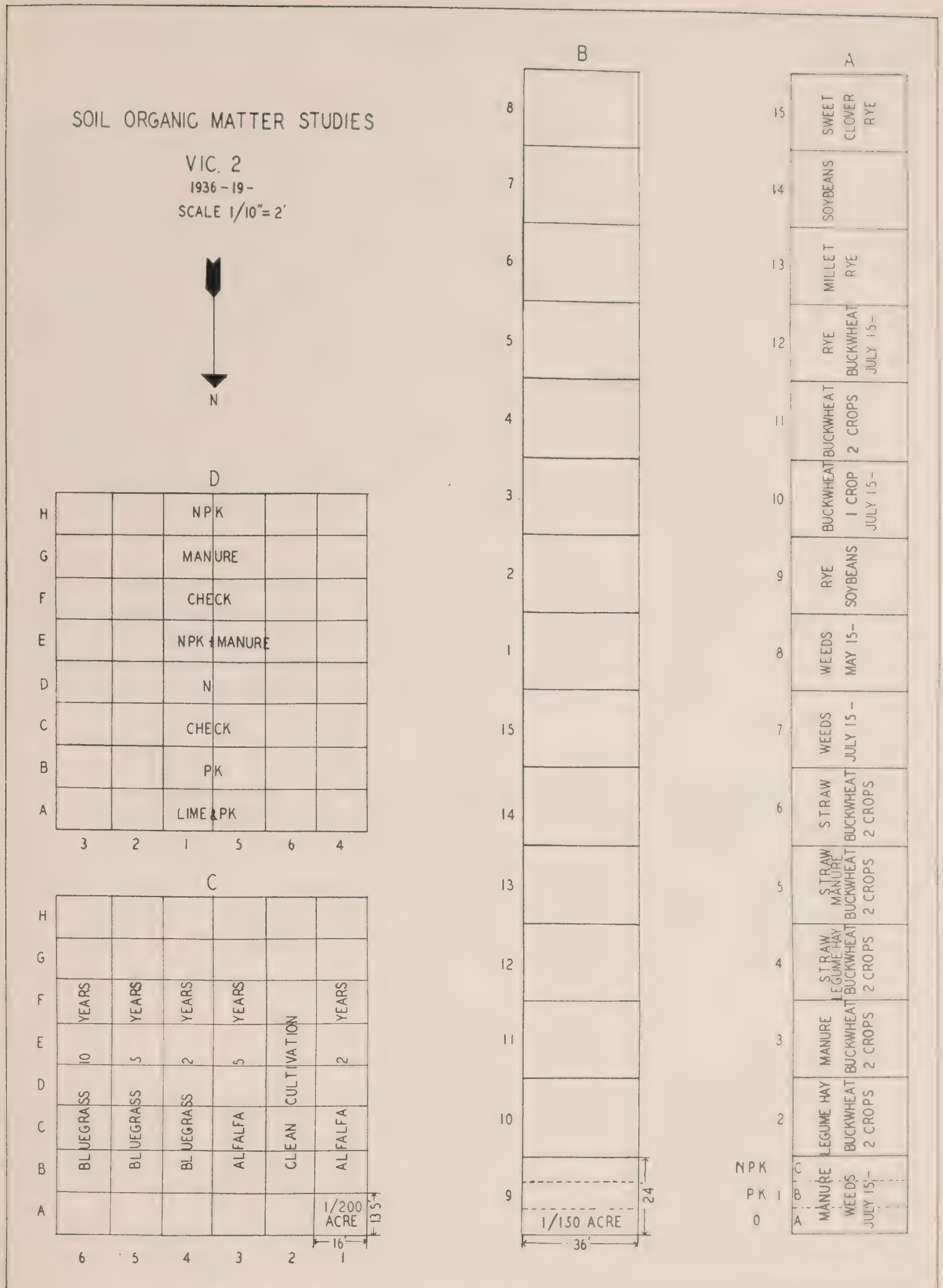

FIG. 16. Plan of the organic-matter plots in this experiment.

the modified Thornton method; potash by the Thornton method; calcium by the Spurway method; and organic matter by the Thomas and Williams method (Proc. Soil Sci. Amer. Vol. 1, 1936).

Physical analyses methods used in the experiment were: Mechanical analysis by the Bouyoucos hydrometer method; volume weight by weighing a given volume in its natural structure; non-capillary porosity was determined on the same cores as the volume weight; and soil aggregation by the "dispersion ratio" method (Middleton, H. E., Properties of Soil which Influence Soil Erosion. U.S.D.A. Tech. Bul. 178. 1930).

The arrangement of plots and their treatments are shown in Fig. 16. The nitrogen fertilizer was in the form of sulphate of ammonia at 300 lb. per acre per year. The phosphate-potash was 0-12-15 at 400 lb. per acre per year. In 1945 however, ammonium nitrate (150 lb. per acre), and 0-12-20 were substituted. The rate for farm manure was 10 tons per acre, and for straw and legume hay, 3 tons per acre. In combinations of these organic supplements, half quantities were used. Manure was applied only every second year to the sod plots. The alfalfa and bluegrass sods were mowed two or three times each season. The mowings were always left where they fell.

Soil samples were taken in the spring of 1936 and of 1946 at two depths—0 to 6 inches, and 6 to 12 inches. In 1936, samples were taken from the whole plot (A and B Series), not from the individual small fertilizer-plot. In view of the nutrient variability in this soil, as shown later, this was an error. In 1946, however, each small plot in A and B Series was sampled. In all cases each soil sample was a composite of three or four borings.

By the spring of 1947 quack grass had become a problem in some of the annual-crop plots (A and B Series). It was decided, therefore, to plant sorghum in all plots of A and B Series, and to keep the soil as clean as possible by cultivation and hoeing in order to get rid of, or to at least weaken, the quack grass. At the same time a reading would be obtained on the relative productivity of the various plots as shown by the growth of sorghum. With this thought in mind, no fertilizer of any kind was added to these two series in 1947.

RESULTS

Organic Matter.

Crop effects. With a reasonable cropping practice it does not seem difficult to maintain the organic-matter content of this sandy loam soil (Table 22). Sods increased it at both levels, and annual crops increased it consistently at the 6- to 12-inch level, but not often in the 0- to 6-inch level unless organic additions such as farm manure, straw, or hay were applied. The consistent increase in the lower level may be due to the method of incorporating the plant residues with the soil, viz., by plowing, usually of about six-inch depth.

Fertilizer effects. Fertilization of the annual green-manure crops has had small, if any, effect on the organic content of the soil (Table 23). Phosphate, potash, and lime have had no significant effect on the organic content of the soil on the sod plots. Farm manure, 10 tons per acre every second year, on the sod has given a significant increase, and the figures suggest that nitrogen has been helpful, but the increases lack significance.

TABLE 22. EFFECT OF CROPPING PRACTICE, AND OF ORGANIC ADDITIONS, ON THE ORGANIC-MATTER CONTENT OF THE SOIL

Treatment	Organic Matter			
	0 to 6 inches		6 to 12 inches	
Annual crops	1936	1946	1936	1946
	%	%	%	%
Buckwheat	2.3	2.2	1.1	1.5
Buckwheat*	2.5	2.4	1.4	1.8
Buckwheat* + Farm Manure	2.5	2.7	1.3	2.0
Buckwheat* + Straw	2.4	2.6	1.3	1.9
Buckwheat* + Farm Manure + Straw	2.3	2.8	1.2	1.9
Buckwheat* + Legume Hay	2.4	2.5	1.2	1.7
Buckwheat* + Legume Hay + Straw	2.4	2.7	0.9	1.8
Rye — Buckwheat	2.2	1.8	2.2	2.5
Rye — Millet	2.5	2.5	1.4	1.9
Rye — Sweet Clover	2.4	2.6	1.0	1.7
Rye — Soybeans†	2.1	2.2	1.0	1.3
Soybeans†	2.3	2.6	1.3	1.8
Weeds From May 15	2.7	2.5	1.0	1.7
Weeds from July 15	2.6	2.3	1.2	1.5
Weeds from July 15 + Farm Manure	2.5	2.2	1.2	1.5
Sod crops				
Alfalfa, 3 years	2.1	2.5	1.4	1.5
Alfalfa, 6 years	2.2	2.5	1.4	1.4
Bluegrass, 3 years	1.8	2.3	1.2	1.5
Bluegrass, 6 years	2.3	2.5	1.1	1.6
Bluegrass, 11 years	2.2	2.4	1.2	1.5
Clean to July 15, then Weeds	2.1	2.0	1.0	1.1

* two crops each year.

† mostly weeds.

TABLE 23. EFFECTS OF FERTILIZATION OF VARIOUS GREEN-MANURE AND SOD COVERS ON THE ORGANIC-MATTER CONTENT OF THE SOIL

Treatment	Organic Matter			
	0 to 6 inches		6 to 12 inches	
Annual crops	1936	1946	1936	1946
	%	%	%	%
Check	2.4	2.4	1.3	1.8
Phosphate — Potash	2.4	2.5	1.3	1.8
Nitrogen — Phosphate — Potash	2.4	2.6	1.3	1.8
Sod crops†				
Checks (2)	2.1	2.2	1.2	1.3
Phosphate — Potash	2.1	2.2	1.4	1.6
Lime — Phosphate — Potash	2.2	2.1	1.3	1.4
Nitrogen — Phosphate — Potash	2.2	2.5	1.3	1.6
Nitrogen — Phosphate — Potash — Farm Manure	1.9	2.7	1.0	1.6
Farm Manure	2.1	2.8	1.3	1.5
Nitrogen	2.0	2.3	1.0	1.4

† One in every six of the plots under each treatment was kept under clean cultivation to July 15.

Total Nitrogen

Total-nitrogen figures have not been included since, with few exceptions, they parallel the organic-matter figures. This was not unexpected since most of the soil nitrogen is contained in the organic complex. With two exceptions, all crop treatments have increased total nitrogen in the subsoil; but there are more exceptions for the surface

soil—all weed plots, and the buckwheat plots which had no organic additions. On the sod plots, farm manure is the only fertilizer which has given a significant increase in total nitrogen, though sulphate of ammonia may have been of some value. On the annual crops no fertilizer (N, P, or K) has given a significant increase in total nitrogen in the soil at the end of ten years' treatment.

Readily Available Phosphorus.

Crop effects—The amount of readily available phosphorus varies greatly within a limited area of this soil (Table 24). In 1936, before differential treatments were given, the range between plots was 8 to 28 p.p.m. in the surface soil, and 4 to 16 p.p.m. in the subsoil. On the whole, the supply of readily available phosphorus has been reduced over the 10-year period, most in the sod areas, and least where organic additions were made to the buckwheat plots. This reduction occurred despite annual applications of 400 pounds per acre of 0-12-15 fertilizer to two out of every three small plots of the annual crops, and to half of the sod plots. It appears therefore that, when the 0-12-15 fertilizer is mixed thoroughly with the soil immediately before sowing the seed (as in this experiment) there must be almost immediate fixation of the phosphorus. Up to 1944 there had been no general increase in dry matter in the tops of the annual or sod crops as a result of phosphate and potash fertilization (1) and rapid fixation of the minerals in an unavailable form may be the explanation.

Fertilizer effects. Applications of 0-12-15 fertilizer appear to have slowed up the drop of readily available phosphorus to some extent and, in some cases, have held it constant; but in no instance has there been an increase in both soil levels (Table 25). If phosphate is a limiting factor in the growth of any of these soil-improving crops it would appear worthwhile to try seed coatings of fertilizer or band applications at various levels below the surface of the soil.

Replaceable Potassium.

Crop effects—As with phosphorus, the supply of readily available (replaceable) potassium is evidently very variable in this soil (Table 26 and Fig. 17). An average of duplicate plots shows a range from 20 to 60 p.p.m. in the surface soil in 1936 before any treatments were given. The range in the subsoil at the same time was considerably less—20 to 28 p.p.m. This variability in surface soil makes more uncertain the analysis of the figures. However, there seems to be no doubt that the organic additions—farm manure, straw, and legume hay—have resulted in marked increases in replaceable potassium in both soil layers. The only exception is in Plot 1 (weeds) where manure additions have given only small increases. Under three treatments, buckwheat one crop, rye—sweet clover, and rye—soybeans, the level of replaceable potassium has not been maintained during the 10-year period. All other treatments have given slight increases in one or both layers. In A and B Series, there is a suggestion that cultivation to July 15 has been detrimental to potassium availability (buckwheat one crop, and two weed plots, 1 and 7) though the explanation is certainly not at all clear. In an apple orchard on this same soil type, replaceable potassium was higher under yearly short-term cultivation than under normal cultivation (2).

TABLE 24. EFFECT OF CROPPING PRACTICES AND OF ORGANIC ADDITIONS ON READILY AVAILABLE PHOSPHORUS IN THE SOIL

Treatment	Readily Available Phosphorus in Solution			
	0 to 6 inches		6 to 12 inches	
	1936 p.p.m.	1946 p.p.m.	1936 p.p.m.	1946 p.p.m.
Annual crops				
Buckwheat	16	12	12	16
Buckwheat*	12	12	8	8
Buckwheat* + Farm Manure	20	24	16	16
Buckwheat* + Straw	16	20	12	8
Buckwheat* + Farm Manure + Straw	20	20	8	8
Buckwheat* + Legume Hay	20	16	16	16
Buckwheat* + Legume Hay + Straw	20	20	16	12
Rye — Buckwheat	16	8	12	8
Rye — Millet	20	8	8	8
Rye — Sweet Clover	12	4	12	4
Rye — Soybeans†	20	16	16	8
Soybeans†	8	8	12	4
Weeds from May 15	8	16	4	8
Weeds from July 15	16	16	4	8
Weeds from July 15 + Farm Manure	28	28	24	20
Sod crops				
Alfalfa, 3 years	20	8	8	8
Alfalfa, 6 years	16	8	12	8
Bluegrass, 3 years	16	8	16	8
Bluegrass, 6 years	8	4	8	4
Bluegrass, 11 years	8	8	12	4
Clean to July 15, then Weeds	20	12	16	8

* two crops each year.
† mostly weeds.

TABLE 25. EFFECT OF FERTILIZATION OF VARIOUS GREEN-MANURE AND SOD COVERS ON THE READILY AVAILABLE PHOSPHORUS IN THE SOIL

Treatment	Readily Available Phosphorus in Solution			
	0 to 6 inches		6 to 12 inches	
	1936 p.p.m.	1946 p.p.m.	1936 p.p.m.	1946 p.p.m.
Annual crops				
Check	16	16	12	12
Phosphate — Potash	16	20	12	12
Nitrogen — Phosphate — Potash	16	16	12	8
Sod crops*				
Checks (2)	12	4	12	4
Phosphate — Potash	20	12	8	8
Lime — Phosphate — Potash	20	8	12	12
Nitrogen — Phosphate — Potash	12	12	12	4
Nitrogen — Phosphate — Potash — Farm Manure	12	12	12	8
Farm Manure	8	8	12	4
Nitrogen	16	4	12	4

* One in every six of the plots under each treatment was kept under clean cultivation to July 15.

With the exception of the 3-year period of alfalfa, all sod treatments have given marked increases in replaceable potassium in both levels. However, quite unexpectedly, the clean-cultivation treatment to July 15 has given increases of similar proportions. There was actually very little weed growth on these strips in C and D Series.

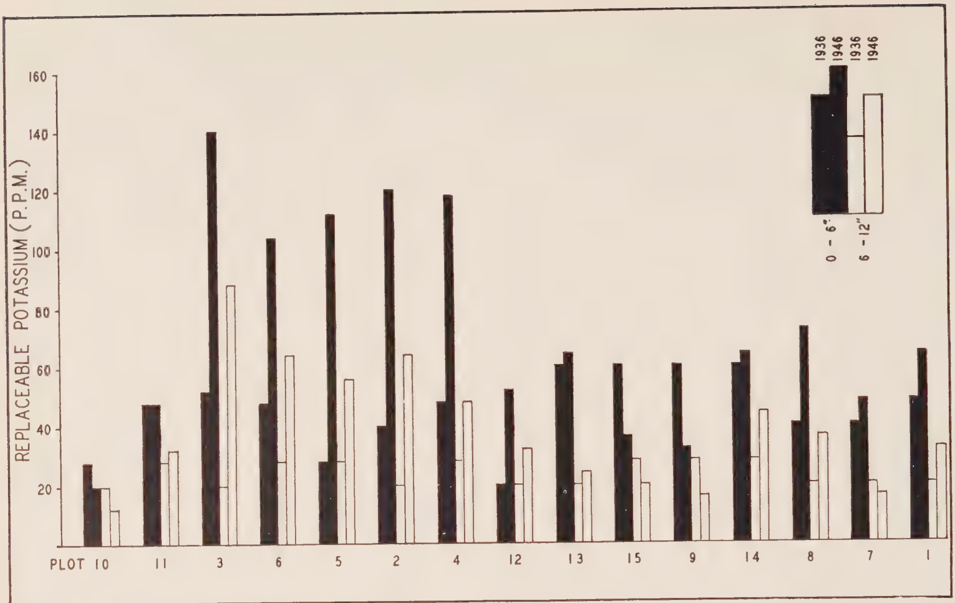

FIG. 17. N/1 NaCl replaceable potassium in the soil in 1936, and in 1946 after receiving for ten years the following treatments grouped by crops:

10—Buckwheat, 1 crop
11—Buckwheat, 2 crops
3—Buckwheat, 2 crops + Farm Manure
6—Buckwheat, 2 crops + Straw
5—Buckwheat, 2 crops + Farm Manure + Straw
2—Buckwheat, 2 crops + Legume Hay
4—Buckwheat, 2 crops + Legume Hay + Straw
12—Rye—Buckwheat (1 crop)
13—Rye—Millet
15—Rye—Sweet Clover
9—Rye—Soybeans
14—Soybeans
8—Weeds—May 15
7—Weeds—July 15
1—Weeds—July 15 + Farm Manure

TABLE 26. EFFECT OF CROPPING PRACTICE, AND OF ORGANIC ADDITIONS, ON THE REPLACEABLE POTASSIUM IN THE SOIL

Treatment	N/1 NaCl Replaceable Potassium in Solution			
	0 to 6 inches		6 to 12 inches	
	1936	1946	1936	1946
Annual crops	p.p.m.	p.p.m.	p.p.m.	p.p.m.
Buckwheat	28	20	20	12
Buckwheat*	48	48	28	32
Buckwheat* + Farm Manure	52	140	20	88
Buckwheat* + Straw	48	104	28	64
Buckwheat* + Farm Manure + Straw	28	112	28	56
Buckwheat* + Legume Hay	40	120	20	64
Buckwheat* + Legume Hay + Straw	48	116	28	48
Rye — Buckwheat	20	52	20	32
Rye — Millet	60	64	20	24
Rye — Sweet Clover	60	36	28	20
Rye — Soybeans†	60	32	28	16
Soybeans†	60	64	28	44
Weeds from May 15	40	72	20	36
Weeds from July 15	40	48	20	16
Weeds from July 15 + Farm Manure	48	64	20	32
Sod crops				
Alfalfa, 3 years	52	48	24	28
Alfalfa, 6 years	48	84	24	52
Bluegrass, 3 years	44	100	24	68
Bluegrass, 6 years	44	108	28	72
Bluegrass, 11 years	36	100	28	60
Clean to July 15, then Weeds	44	84	28	56

* two crops each year. † mostly weeds.

Fertilizer effects—When all annual-crop treatments are bulked together (Table 27), there appears to be no significant effect from fertilizer applications, even from potash applications. One would have expected the annual application of 400 pounds per acre of 0-12-15 fertilizer for 10 years to have shown an appreciable increase over the check in replaceable potassium, but such was not the case. A very high proportion must have been changed into an unavailable form.

In contrast to the annual crops, there appears to be some increase in replaceable potassium, not always significant, from applications of 0-12-15 on the sod cover; but the greatest increase was derived from applications of 10 tons of farm manure per acre every second year. Nitrogen and lime were of no value in making potassium more readily available, and it is likely that the major effect from 0-12-15 was a direct one from the potassium contained therein.

TABLE 27. EFFECTS OF FERTILIZATION OF VARIOUS GREEN-MANURE AND SOD COVERS ON THE READILY AVAILABLE POTASSIUM IN THE SOIL

Treatment	N/1 NaCl Replaceable Potassium in Solution			
	0 to 6 inches		6 to 12 inches	
	1936	1946	1936	1946
Annual crops	p.p.m.	p.p.m.	p.p.m.	p.p.m.
Check	48	72	24	36
Phosphate — Potash	48	88	24	48
Nitrogen — Phosphate — Potash	48	64	24	36
Sod crops*				
Checks (2)	48	68	24	36
Phosphate — Potash	40	84	24	56
Lime — Phosphate — Potash	52	80	24	52
Nitrogen — Phosphate — Potash	40	84	24	56
Nitrogen — Phosphate — Potash — Farm Manure	44	116	28	84
Farm Manure	48	104	24	68
Nitrogen	36	76	28	44

* One in every six of the plots under each treatment was kept under clean cultivation to July 15.

Water-soluble Calcium.

There does not seem to be any significant crop or fertilizer effect on the water-soluble calcium except that the sod crops are maintaining the level better than the annual crops (Table 28). There is a suggestion too, that farm manure and lime have been of benefit but it is by no means a clear relation. With the annual crops, the reduction both in surface soil and subsoil has been consistent, and is, without doubt, a significant trend. With the sod crops, the trend is irregularly up and down in the 10-year period.

TABLE 28. AVERAGE AMOUNTS OF SPURWAY WATER-SOLUBLE CALCIUM

Treatment	Water-soluble Calcium in Solution			
	0 to 6 inches		6 to 12 inches	
	1936	1946	1936	1946
	p.p.m.	p.p.m.	p.p.m.	p.p.m.
Annual crops	199	170	171	156
Sod crops	178	173	151	149

Acidity.

In 1936 the pH readings of the top soil (A and B Series) averaged 7.42, and of the subsoil, 7.27. In all sections of the experiment there has been a tendency for the topsoil to become more acid and the subsoil to become more alkaline, i.e., they are tending to equality in value. There has been no measurable effect from either crop or fertilizer treatment. Even hydrated lime, applied in 1936 and 1941 at 2000 pounds per acre (total 4000) did not give an appreciable lasting effect on the sod plots, for the increase 1946 over 1936 is of doubtful significance.

Physical Measurements.

In May 1947, soil samples for physical analysis were taken from the surface soil of some of the sub-plots in A and B Series. For dispersion-ratio readings, samples were obtained from all NPK sub-plots but, on account of a shortage of sampling cores, volume weight and non-capillary porosity samples were taken from only 5 of the 15 crop treatments (Table 29).

Good structure in a soil is associated with *low* volume weight, *low* dispersion ratio, and *high* non-capillary porosity. Judging from positional changes in these measurements it is obvious that there are no significant differences between the organic supplements in their effects on the physical nature of the soil. There is, however, evidence from all three measurements that one crop of buckwheat, sown about July 15, has failed to keep the soil structure up to the level of the other treatments (Table 29). The better soil structure of the plots given organic additions may be due in part to the organic additions and in part to less cultivation, for the first crop of buckwheat was sown on these plots about May 15. Cultivation therefore, was for about two months longer on the plots on which one crop of buckwheat was grown.

TABLE 29. PHYSICAL MEASUREMENTS OF THE SURFACE SOIL OF SELECTED PLOTS IN THE SPRING OF 1947

Treatment	Volume Weight	Dispersion Ratio	Non-capillary Porosity
	lb. per cu. ft.		%
Buckwheat* + Farm Manure + Straw	75.8†	25.3	15.3
Buckwheat* + Legume Hay	77.8	25.5	14.2
Buckwheat* + Legume Hay + Straw	78.4	23.8	15.8
Buckwheat* + Farm Manure	79.0	25.3	17.2
Buckwheat 1 crop, July 15	83.5	29.6	11.8

* two crops each year.

† each figure represents an average of four samples from A and B Series.

Relation Between Organic Matter and Aggregation of Soil Particles.

Dispersion ratios were obtained for all NPK plots in A and B Series. To change this measure of structure into comparative terms of particle aggregation, each reading was subtracted from 100. When the order of magnitude of these new figures is compared with the organic-matter content in 1946 and its increase during the preceding 10-year period, there appears to be a variable relationship (Table 30). It must be admitted, however, that the number of samples represented in each figure is insufficient for the purpose.

In addition to organic matter, there is another factor which may play a part in the aggregation of soil particles, viz., cultivation. It may not be without significance that four of the six lowest in aggregation are treatments where cultivation was continued until July 15. That three out of these low six include rye may also be an indication that rye is not conducive to aggregation. Some confirmation is lent to this idea in that both soybeans alone, and buckwheat (one crop), show better aggregation than when rye is used with them as a winter cover.

TABLE 30. RELATION BETWEEN ORGANIC MATTER AND THE AGGREGATION OF SOIL PARTICLES IN THE SURFACE SOIL OF A AND B SERIES

Treatment	Organic Matter 1946	Increase in Organic Matter 1936 to 1946	Aggregation° (100 — dispersion ratio)
	%	%	
(Number of samples from each treatment)	2	2	4
Buckwheat* + Farm Manure + Straw	2.8	.5 (1)	74.7 (7)
Soybeans†	2.7	.3 (2)	77.8 (4)
Rye — Sweet Clover	2.7	0. (5)	80.7 (1)
Rye — Buckwheat	2.7	0. (5)	66.3 (14)
Buckwheat*	2.7	-.1 (6)	75.3 (6)
Buckwheat* + Farm Manure	2.6	.3 (2)	74.7 (7)
Buckwheat* + Straw	2.6	.2 (3)	78.1 (3)
Buckwheat* + Legume Hay + Straw	2.6	.2 (3)	76.2 (5)
Weeds from July 15	2.6	0. (5)	74.4 (9)
Weeds from July 15 + Farm Manure	2.5	.1 (4)	73.7 (11)
Rye — Millet	2.5	.3 (2)	73.5 (12)
Buckwheat* + Legume Hay	2.4	0. (5)	74.5 (8)
Buckwheat	2.3	.1 (4)	70.4 (13)
Rye — Soybeans†	2.2	.3 (2)	73.9 (10)
Weeds from May 15	2.2	0. (5)	79.2 (2)

° necessary difference for significance = 5.2.

* two crops each year. † mostly weeds. ( ) order of magnitude.

As already explained under Materials and Methods it became necessary in 1947 to grow a hoe crop as a means of reducing the amount of quack grass in some of the plots. To obtain a reading on the productivity of the plots at the same time, sorghum was planted throughout A and B Series. No fertilizer, organic or inorganic, was applied in that year, so that only the residual effects of the annual fertilizer applications from 1936 to 1946 inclusive might be measured. The sorghum was harvested in the fall just as the seeds were forming, green weight and dry weight per acre being determined. With the exception of 500 grams from each fertilizer plot, all sorghum was put back in the chopped form on the plot on which it had grown.

The yield of sorghum fodder ranged from a high of 4.5 tons to a low of 3.4 tons of dry matter per acre (Table 31). This is not nearly as great a range as that shown by the various crops grown on the plots for the preceding 11 years. Furthermore, the yield of sorghum was not closely related to the previous yields of other crops on the same plots. It does seem, however, that straw alone and in combination with farm manure had, even a year after its last application, a depressive effect on the growth of sorghum. Had the whole plot, instead of just one-third of it, received nitrogen the depressive effect might have been reduced or even eliminated.

Legume hay alone or in combination with straw seems to be a satisfactory substitute for farm manure, at least insofar as the growth

of buckwheat and sorghum is concerned. The commonly used summer covers of weeds and buckwheat (1 crop sown in July) do not show up very well in their own top growth or in the dry weight of sorghum obtained from such plots. The increase in organic matter after 10 years does not seem to be a good measure of the productivity of this soil.

TABLE 31. RELATIONS BETWEEN DRY MATTER IN THE TOPS OF ANNUAL CROPS 1936 TO 1945, INCREASE IN ORGANIC-MATTER CONTENT OF THE SOIL, AND THE TOTAL DRY-MATTER FROM A SORGHUM CROP IN 1947

Treatment	Yield° of Dry Matter Per Acre Per Year	Increase in Organic Matter‡	Dry Matter of Sorghum Per Acre in 1947
	tons	%	tons
Rye — Soybeans†	2.9	0.2 (6)	3.7 (6)
Buckwheat* + Legume Hay	2.6	0.3 (4)	4.5 (1)
Buckwheat* + Legume Hay + Straw	2.5	0.6 (1)	4.3 (2)
Buckwheat* + Farm Manure	2.4	0.4 (3)	4.0 (3)
Buckwheat* + Farm Manure + Straw	2.2	0.6 (1)	3.7 (6)
Soybeans†	2.2	0.4 (3)	3.8 (5)
Rye — Buckwheat	2.2	-0.15(9)	3.6 (7)
Buckwheat*	2.1	0.15(7)	3.6 (7)
Rye — Millet	2.1	0.25(5)	3.7 (6)
Buckwheat* + Straw	2.1	0.4 (3)	3.5 (8)
Rye — Sweet Clover	2.0	0.45(2)	3.7 (6)
Weeds from July 15 + Farm Manure	2.0	0. (8)	3.9 (4)
Weeds from July 15	1.5	0. (8)	3.4 (9)
Weeds from May 15	1.5	0.25(5)	3.4 (9)
Buckwheat	1.3	0.15(7)	3.6 (7)

° in order of magnitude. ‡ 0 to 12 inches, 1936 to 1946.
* two crops each year. † mostly weeds. ( ) order of magnitude.

DISCUSSION

It appears to be difficult to *raise* the level of organic matter in the Vineland Fine Sandy Loam soil, but not much of a problem to *maintain* it at its present level. However, a maximum amount of organic material must be grown on the soil. This can only be accomplished by early seeding of green-manure crops and intelligent fertilization of them. However, even under the best management of green-manure crops it may still be necessary to make occasional applications of organic materials—farm manure, hay, or straw.

As on Vineland Clay Loam (3), results with surface applications of phosphate and potash on Vineland Fine Sandy Loam soil, have been disappointing, largely, if not wholly, due to a rapid change to a form unavailable to plants. Seed coatings of these minerals and "band" fertilization should be tried under these conditions. As long as sods are being used, with mowings allowed to remain on the land, the supply of replaceable potash seems to be assured; likewise, where organic additions are being used with clean cultivation plus cover crops. On the other hand, no treatment, organic or inorganic, given in this experiment has been fully effective in keeping up the supply of readily available phosphate. If it is a limiting factor in the growth of some of these crops, better phosphate fertilizers or better methods of application must be found.

The treatments which call for the least cultivation and the greatest additions of organic matter appear to yield the most desirable soil struc-

ture. A more extensive study of the effects on structure, of cultivation, of various crops, and of various organic additions would be desirable.

SUMMARY

Since 1936, various green-manure, sod, and fertilizer treatments have been given on $1\frac{1}{2}$ acres of land classified as Vineland Fine Sandy Loam. This paper deals mainly with the changes in the soil during the first ten-year period.

Alfalfa and bluegrass sods increased the organic matter in both layers (0 to 6 inches, and 6 to 12 inches) and the annual green-manure crops gave a consistent increase at the second depth but not often in the topsoil. Neither the organic additions nor the N, PK, and NPK fertilizers gave appreciable increases in the soil organic-matter with one exception, viz., farm manure on the sod plots.

The supply of available phosphorus and potassium was very variable from plot to plot when the experiment was initiated in 1936, and was still variable in 1946. Annual per-acre applications of 400 pounds 0-12-15 fertilizer have had very little effect in raising the level of available phosphorus and potassium. Evidently all or a very high proportion of this fertilizer (0-12-15) has been fixed in an unavailable form. Additions of farm manure, legume hay, and straw, (alone and in combination) have had a marked effect in increasing the replaceable potassium, but not the available phosphorus. The water-soluble calcium has been reduced significantly in the annual-crop plots but very slightly in the sod plots in the ten-year period. No crop or fertilizer has had any appreciable effect on soil acidity, the general tendency being towards increased acidity in the topsoil and decreased in the subsoil, irrespective of treatment.

After ten years' treatment, the soil which was cultivated until May 15 and which received annual applications of organic materials, had better structure than the soil kept cultivated until July 15 and with no organic additions. However, there was no clear-cut relation between the organic-matter content of the surface soil in 1946, or its increase in the preceding ten-year period, and the aggregation of the soil particles.

The yield of dry fodder from an all-over crop of sorghum in 1947 was not closely related to either the yield of dry matter of the various annual crops or to the increase in organic matter in the soil from 1936 to 1946.

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SOIL EROSION AS A FACTOR IN TOMATO PRODUCTION

E. A. Kerr

Severe gully erosion is obvious in its effects. Perhaps not so obvious are the effects of those relatively small, shallow erosions which normally are quickly filled in by ordinary cultivation practices, and then forgotten. Data are presented showing the effects on production in 1947 caused by such small gully-erosions in a field of tomato trial-plots at the Horticultural Experiment Station.

These trial-plots occupied an area of 1.86 acres divided into two replications. The west side of Replication 1 of this flat-to-gently-rolling field of Vineland Fine Sandy Loam included a mild depression with sides having a three-percent slope (Fig. 18). The rows were planted parallel to this depression. The location was fallow in 1946 until planted to a cover crop of hairy vetch and rye in the late summer. In 1944 and 1945 it was in mixed vegetables also planted parallel to the depression. Previous to this, an apple orchard occupied the ground.

Fertilizer (2-12-6) at the rate of five hundred pounds per acre was applied at plow-sole depth when the cover crop was being turned under in the spring of 1947. The tomato plants were side-dressed with 500 pounds per acre of the same fertilizer when the third flower-cluster was in bloom.

Cold, wet weather prevented transplanting of the tomatoes to the field until June 4. By this date the plants had been unduly checked in their growth but nevertheless, subsequently made excellent growth.

Four hundred and thirty-five indeterminate tomato varieties were grown in two randomized replications of five plants each, planted 3 feet x 5½ feet. (In this paper, the term "variety" refers to both standard varieties and first-generation hybrids). Identification of varieties was by number, e.g., No. 56 was Bonny Best and No. 253 was the first-generation hybrid, Garden State x Indiana Baltimore. The varieties varied considerably in productivity, season, type of growth, and type of fruit. This does not affect the validity of the observations since each variety growing in Replication 1 was compared with itself growing in Replication 2. A border row of miscellaneous tomatoes, which were not harvested, surrounded each replication. The first picking was made on August 15. The final one was completed on October 7 at which date almost the total crop had matured. A few fruits were rendered unsaleable by late blight, but these, together with the immature fruits, are included in the data here presented. The average production per five plants was 102.2 pounds (26.98 tons per acre) with a standard error of 18.7 pounds.

Although not noted until the spring of 1947, there was then evidence that earlier erosions had taken place during the cultivation period. These erosions, mild in character, had occurred in the area between Rows 2 and 8 (as planted in 1947,—Fig. 18). Subsequent cultivations had effaced them.

Further erosion occurred on June 7, 1947, three days after planting, when a recorded rainfall of 1.05 inches took place. Of this, 0.88 inches fell in 1½ hours. The run-off from a neighboring farm burst through a

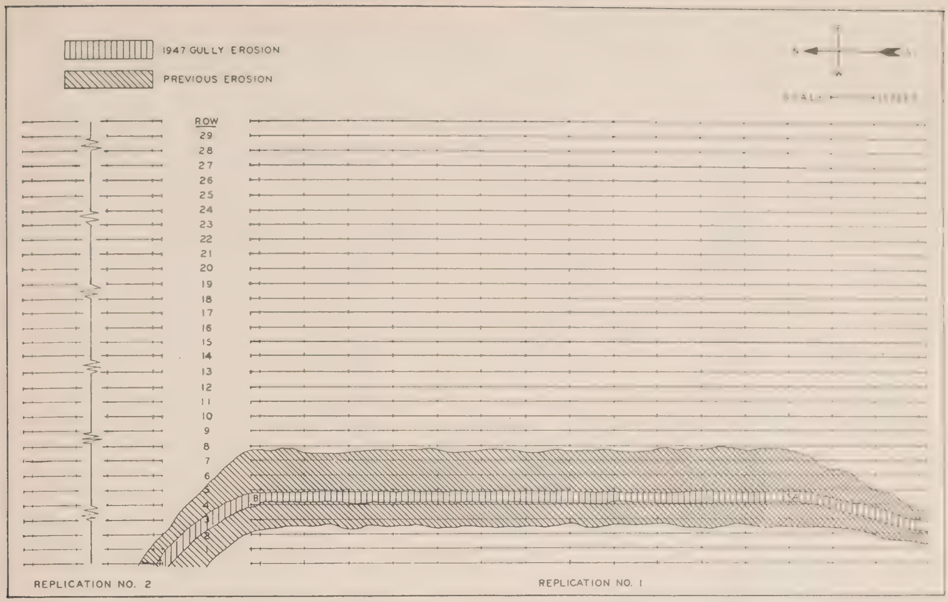

FIG. 18. Diagram of tomato trial-plots in 1947 showing the extent of the eroded area. The production of the varieties growing along the sides of the shallow gully from B to A in Replication 1 is compared with the production of the same varieties growing in Replication 2. The varieties were randomized in the two replications.

sod headland and, in a narrow stream, angled through two rows of tomatoes and then passed between Rows 4 and 5 of Replication 1 for a distance of 180 feet. (A to B, Fig. 18). The force of the running water gouged out a gully five to six inches deep (plow depth) and three to four feet wide. No plants were washed out nor were their roots exposed. The rows growing parallel to the straight portion of the erosion are considered in this paper.

A crown had been made in the approximate location of Row 5 when the land was plowed in the spring. To a large extent, this was levelled off during pre-planting cultivation but there was still sufficient rise to keep the water course between Rows 4 and 5. The 1947 gully was cultivated the same as the rest of the field and by August 1 only a slight dip remained. After disking and seeding to rye in November, the gully was obliterated. As a soil-conservation practice, regular water-courses are kept in sod but so rarely had a water-course been formed in this particular location that it was not sodded. The soil in this field is sufficiently level and pervious to handle heavy rainfall.

Table 32 gives yield data for each variety growing in Rows 4 and 5 along the sides of the gully, and also in Rows 9 and 10, of the same replication. The yields of the same varieties in Replication 2 (non-eroded) are recorded for comparison. Both replications were independently randomized so that the data for Replication 2 gives a cross-section of the whole plot. There was no significant difference between the yields of the varieties in the non-eroded areas of the two replications.

Table 32. Yields of tomato varieties in eroded and non-eroded areas of Replication 1 compared with the yields of the same varieties in Replication 2 (non-eroded)

Variety number	Rep. 1 Row 4 Eroded	Rep. 2 Non-eroded	Variety number	Rep. 1 Row 5 Eroded	Rep. 2 Non-eroded	Variety number	Rep. 1 Row 9 Non-eroded	Rep. 2 Non-eroded	Variety number	Rep. 1 Row 10 Non-eroded	Rep. 2 Non-eroded
	lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.
402	62.0	124.5	80	53.5	120.0	221	90.5	69.0	63	86.5	78.0
185	58.5	108.5	376	55.0	101.0	393	104.0	109.5	257	104.0	118.5
56	41.0	76.0	253	76.5	96.5	86	102.0	105.0	85	128.0	112.0
249	44.0	105.5	28	57.5	120.0	68	75.5	95.5	226	94.0	133.0
205	56.5	110.0	103	88.0	116.0	415	88.5	117.0	203	64.5	109.0
371	68.0	96.0	387	89.0	105.5	166	94.0	101.0	45	115.0	104.0
272	45.5	75.5	436	62.0	118.0	180	97.5	74.0	355	119.0	111.5
52	49.5	94.0	343	50.5	97.0	277	103.5	103.0	96	110.0	96.0
16	48.0	84.5	356	65.0	125.5	194	103.0	93.0	352	107.0	101.5
337	88.5	113.5	38	81.0	92.5	409	100.5	100.0	250	104.5	93.5
128	58.5	107.0	239	79.0	71.5	209	107.5	116.0	123	100.0	123.0
261	66.0	91.5	122	80.5	149.0	247	86.5	78.0	60	94.0	55.5
Total	686.0	1186.5		837.5	1312.5		1153.0	1161.0		1226.5	1235.5
Mean*	57.2	98.9		69.8	109.4		96.1	96.8		102.2	103.0

* A difference of 20.8 pounds between the means is statistically significant at odds of 100 to 1.

TABLE 33. YIELDS OF THE FIRST TWELVE ROWS OF TOMATOES ON THE WEST SIDE OF REPLICATION 1, COMPARED WITH THE SAME VARIETIES IN REPLICATION 2 (NON-ERODED)

	Replication 1		Replication 2**		Difference
	Total	Mean	Total	Mean	of Means
Row	lb.	lb.	lb.	lb.	lb.
1	1175.5	98.0	1315.5	109.6	11.6
2	1126.5	93.9	1273.5	106.1	12.2
3	1032.5	86.0	1302.5	108.5	22.5*
4	686.0	57.2	1186.5	98.9	41.7*
5	837.5	69.8	1312.5	109.4	39.6*
6	755.0	62.9	1255.0	104.6	41.7*
7	882.0	73.5	1259.0	104.9	31.4*
8	1094.5	91.2	1256.0	104.7	13.5
9	1153.0	96.1	1161.0	96.8	0.7
10	1226.5	102.2	1235.5	103.0	0.8
11	1184.5	98.7	1235.5	103.0	4.3
12	1371.5	114.3	1287.5	107.3	7.0

** Yields in Replication 2 are of the same varieties as grown in the respective rows of Replication 1. The varieties were randomized throughout the replications.

* A difference of 20.8 pounds between means is statistically significant at odds of 100 to 1.

The total and average yields of the eroded area and the rows on both sides of it are given in Table 33. Similar data are recorded for the same varieties growing in Replication 2. Production was significantly decreased in Rows 3 to 7 of Replication 1, i.e., the rows where shallow gully-erosions had occurred from time to time. The decrease in yield caused by erosion from the 180-foot length of these rows was 2122.5 pounds (9.34 tons per acre).

Sheet erosion often is a factor in loss of fertility on rolling land. Heavy rains move the soil from the regions of most abrupt slope and deposit it at the bottom of the depressions. However, in the field under consideration, the plants growing on the sides of the depression (Rows 1, 2; and 8 to 12) were as productive as those in the rest of the field. Detectable sheet erosion had not taken place. The practice of planting rows across the slope had been effective in preventing this type of erosion. Significant erosion had taken place only where there was run-off from the neighboring farm.

THE WEATHER

J. R. vanHaarlem

The Horticultural Experiment Station is in the Niagara Peninsula, on the south shore of Lake Ontario, in the County of Lincoln, Province of Ontario; Latitude 43° 11′ 22″ North, Longitude 79° 23′ 52″ West, with an elevation of 260 feet above sea level.

Apart from this "southern" latitude (approximately that of southern Oregon), the Niagara fruit area enjoys other advantages of climate and topography. The highly-developed "peach" belt is along the south shore of Lake Ontario, on land which was once lake bottom. This belt of peach land stretches from the head of Lake Ontario (City of Hamilton) at the west, to the Niagara river at the east, a distance of about 50 miles. In width, from the present lake to the ancient lake bank (the escarpment or "mountain"), the belt varies from one to eight miles.

The Great Lakes as a whole exert a modifying influence, Lake Ontario particularly so. Other influences are the escarpment itself, and the gently sloping northern exposure from the escarpment to the lake.

While the climate of the entire fruit-growing area of the Peninsula is ameliorated by the presence of Lake Ontario, the one-half mile area bordering on the shore is influenced more than the remainder. For instance, at the Experiment Station, which borders on the lake, the cool lake-winds delay blossoming in the spring, and fruit maturity in the fall. Also, during the winter, this one-half mile area may range up to 5 (and even more) degrees warmer than further back from the lake.

No attempt was made, in earlier Station reports, to summarize weather data. The accompanying tables, charts, and graphs represent an effort to summarize, in easily understandable form, the accumulated data for the period 1913 to 1938, and more particularly the 20-year period, 1929 to 1948 inclusive.

Temperature.

The mean annual temperature at the Station is 47.7° Fahrenheit. Maximum summer temperatures run well into the 90's every year, and during the past 20 years, three years (1931, 1936, and 1948) have had summer temperatures over 100° F.

Cold winter temperatures, particularly those accompanied by high winds, greatly influence subsequent fruit crops. Severe damage to fruit buds resulted from low temperatures during the winters of 1913-14, 1917-18, 1933-34, and 1942-43. The lowest temperatures in these years at the Station were -13, -16, -14, and -13 degrees Fahrenheit respectively. Temperatures back from the lake and especially west to Hamilton were several degrees lower. Generally, temperatures dip slightly below zero once or twice each winter. In the past 20 years, below-zero temperatures occurred in eleven years.

Degree-days Heat Units. A degree-day heat unit is 1° Fahrenheit above 50° for twenty-four hours. For example, if the mean temperature for the day was 70°F the summation would be 20 degree-day units. If the mean for June was 65°F the summation would be 450 degree-day

units (15 x 30). At this Station there is a 20-year mean of 2307 degree-day heat units, with a low of 2000 in 1940 and a high of 2662 in 1930.

The summation of heat above 50°F is a valuable factor in estimating the possibility of growing a new fruit variety. Much work with vinifera grapes has been done in California along this line. For instance, the Thompson Seedless grape requires 2000 degree-days for full maturity; the Emperor grape, on the other hand, requires 3300 degree-days to reach maturity. With a mean of 2307 degree-days at Vineland the Thompson Seedless grape could be grown to maturity provided other growing conditions were suitable. The Emperor grape could not be matured at all.

TABLE 34. ANNUAL WEATHER DATA, 1929 TO 1948 INCLUSIVE

Year	Temperature			Precipitation			Sunshine
	Highest	Lowest	Degree-days heat units over 50°F.	Rain	Snow*	Total	
	°F.	°F.		inches	inches	inches	hours
1929	96.0	0	2100	26.91	36.70*	30.58	1881
1930	98.0	0	2662	21.63	31.70	24.80	2041
1931	101.0	2.0	2632	26.19	30.80	29.27	2061
1932	94.0	6.5	2246	33.81	32.80	37.09	2105
1933	98.0	-5.1	2476	25.77	41.50	29.92	2105
1934	96.5	-14.0	2376	20.90	37.20	24.62	2084
1935	95.8	-3.3	2105	20.49	35.70	24.06	1931
1936	103.4	-3.4	2403	22.47	59.30	28.40	2061
1937	93.3	9.5	2321	28.56	25.30	31.09	1980
1938	93.6	-6.0	2286	25.01	38.70	28.88	2005
1939	94.6	-1.6	2386	25.39	44.70	29.86	2155
1940	91.5	1.3	2000	28.07	70.70	35.14	1916
1941	97.8	5.0	2541	18.66	35.60	22.22	2109
1942	93.2	-5.0	2275	34.35	59.30	40.28	1870
1943	93.9	-13.0	2221	27.64	47.20	32.36	1923
1944	96.3	-3.8	2406	24.92	75.60	32.48	2031
1945	92.0	-8.7	2144	39.17	44.50	43.62	1928
1946	95.0	2.7	2044	22.25	39.90	26.24	2167
1947	95.6	3.5	2208	25.32	51.50	30.47	1951
1948	102.7	-4.0	2257	25.05	42.30	29.28	2059
Mean			2307	25.95	39.69*	29.92	2021

* Ten inches of snow equals one inch of rain.

TABLE 35. MONTHLY MEANS OF TEMPERATURE, PRECIPITATION, AND HOURS OF SUNSHINE, WITH HIGHEST AND LOWEST TEMPERATURE RANGES

	Temperature			Precipitation			Sunshine
	Mean	Range		Rain	Snow*	Total	
		Highest	Lowest				
	°F.	°F.	°F.	inches	inches	inches	hours
January	25.5	62.6	-8.7	1.24	9.87*	2.22	78.6
February	25.1	59.8	-16.0	1.15	10.58	2.21	99.3
March	33.5	78.5	-2.3	1.76	6.35	2.40	138.3
April	43.6	84.1	17.8	2.53	1.58	2.69	175.9
May	54.2	90.3	28.0	2.86		2.86	228.0
June	64.9	96.3	35.3	3.09		3.09	260.6
July	71.3	103.4	45.7	2.60		2.60	285.6
August	70.0	102.7	41.0	2.28		2.28	259.7
September	63.4	96.0	31.0	2.75		2.75	187.1
October	51.5	86.0	20.0	2.50	0.04	2.50	156.9
November	40.4	75.2	8.8	2.02	2.59	2.28	88.5
December	29.5	62.1	-5.1	1.17	8.67	2.04	62.5

* Ten inches of snow equals one inch of rain.

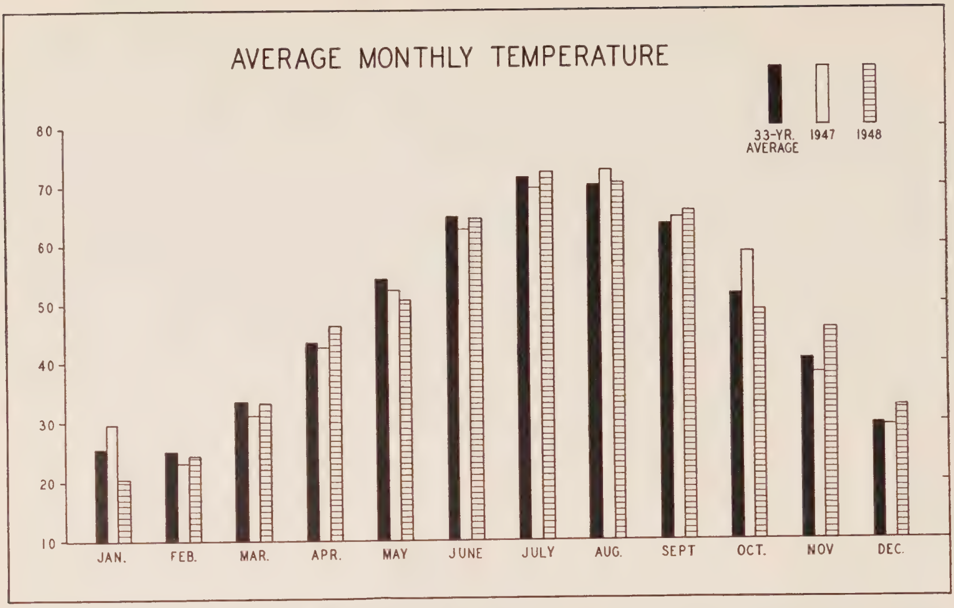

FIG. 19. Average Monthly Temperature, 1947 and 1948. In 1947, January and October were considerably warmer than the 33-year average. November and December 1948 also were above average.

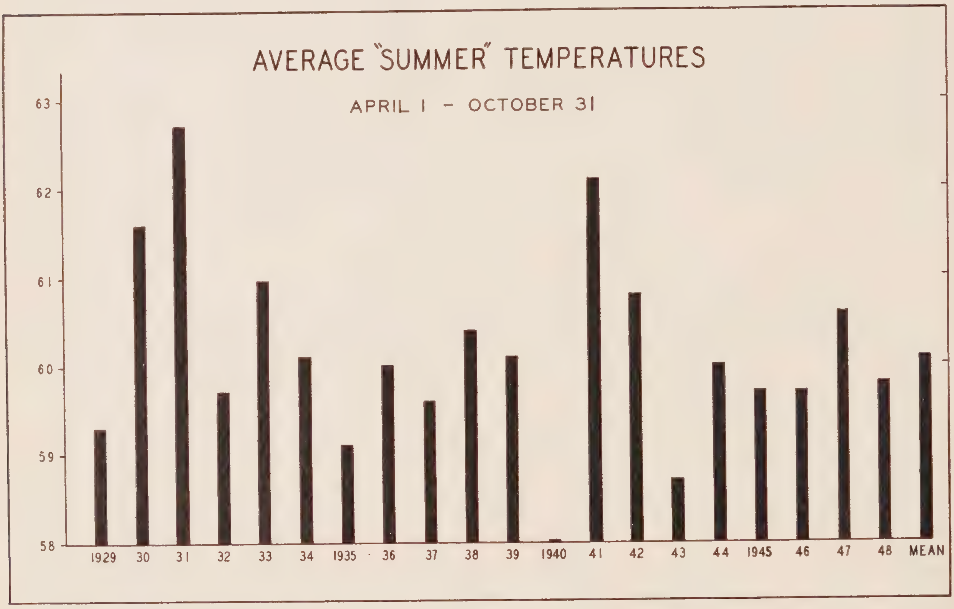

FIG. 20. Average "Summer" Temperature, April 1 to October 31, 1929 to 1948. The coolest season and the longest growing-period occurred in 1940. High temperatures and high humidity made July 1936 most oppressive, yet there were several years with higher average "summer" temperatures.

Note that in Figs. 20 and 24, and in the text material, "Summer" does not mean the calendar summer of three months (June 21 to September 21), but is applied loosely to the seven-month growing period, April 1 to October 31.

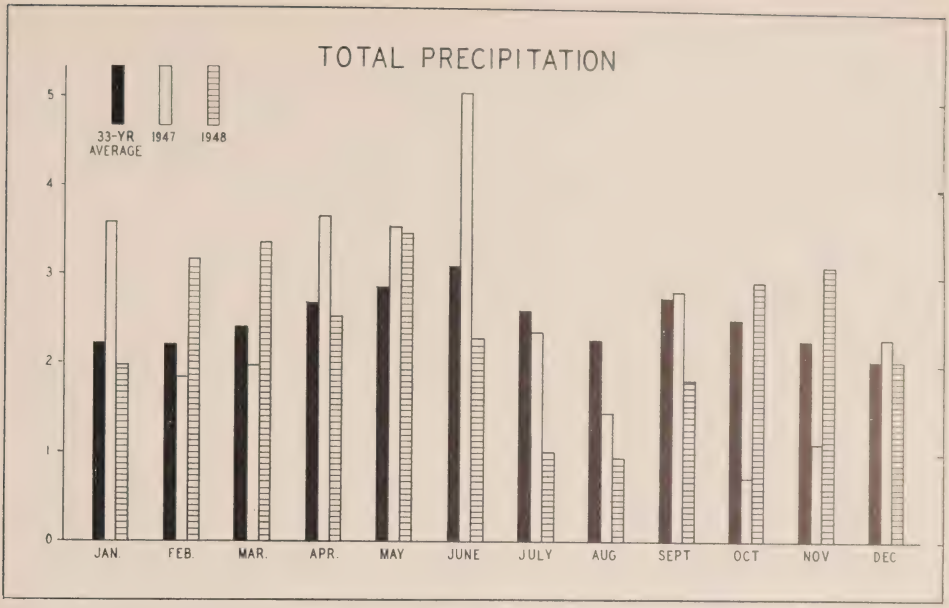

FIG. 21. Total Precipitation (Rain plus Snow), 1947 and 1948. Note the heavy rains in April, May and June of 1947 followed by five months of over-all dry weather.

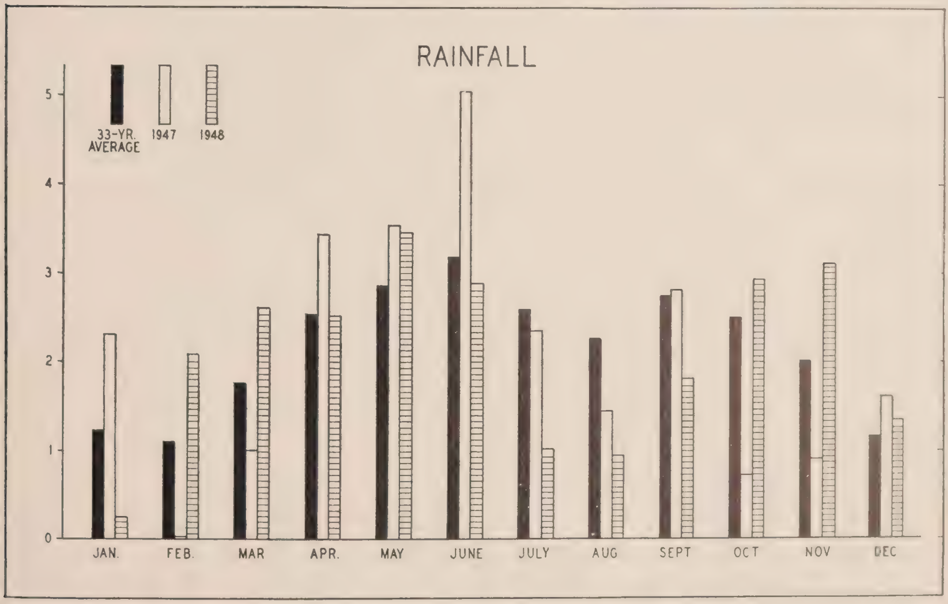

FIG. 22. Rainfall only, 1947 and 1948. The 5.05 inches of rain in June 1947 was the greatest June rainfall since 1918.

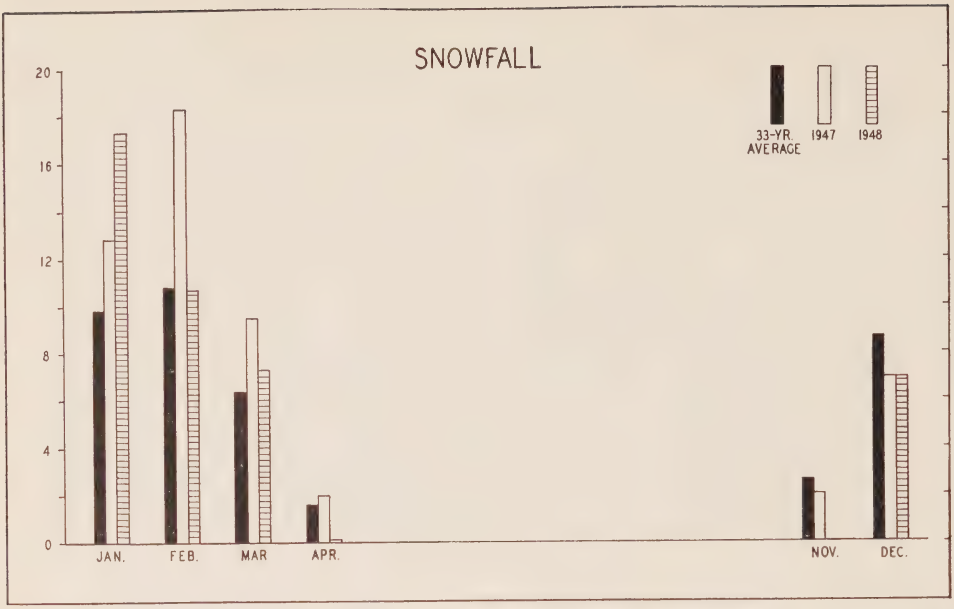

FIG. 23. Snowfall in both 1947 and 1948 was heavier than average for the January to March period. Lack of continuous snow-cover and cold, dry winter winds frequently cause considerable frost damage to roots of fruit trees.

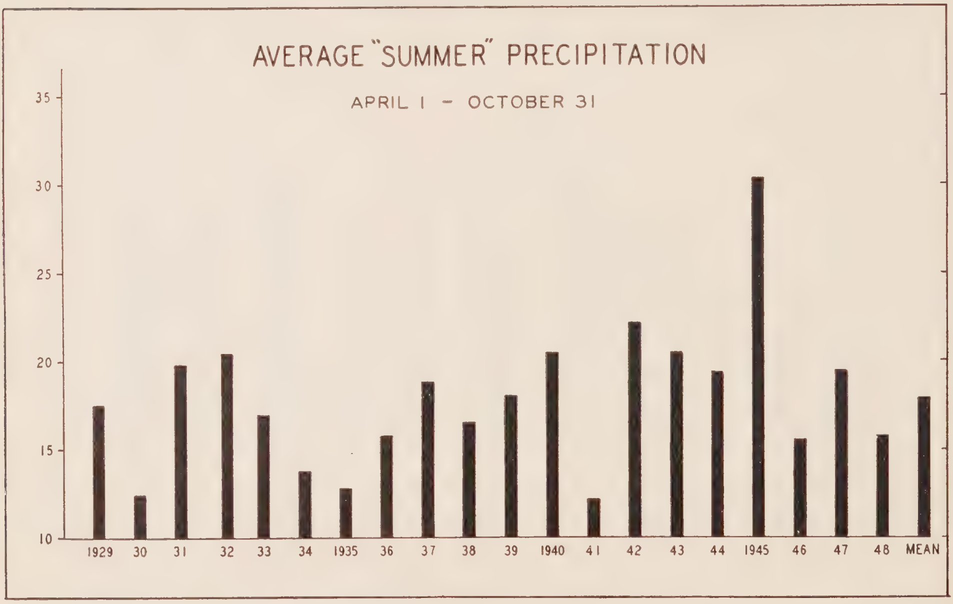

FIG. 24. Average "Summer" Precipitation, April 1 to October 31, 1929 to 1948. The growing season of 1945 was a record for rainfall. September rains amounted to 9.28 inches.

Precipitation.

Rain and Snow. The mean annual total precipitation at this Station is 29.92 inches. The range is from a high of 43.62 inches in 1945 to a low of 22.22 inches in 1941.

Rain Only. The mean annual rainfall at the Station is 25.95 inches, but it has varied from a high of 39.17 inches in 1945 to a low of 18.66 inches in 1941.

Normally the precipitation during the spring and fall months is adequate, having in mind the lower evaporation and transpiration losses then as compared with July and August. However, "normal" rainfall is not always "actual" rainfall, and distribution too may be poor in terms of crop needs. Thus, summer rainfall, especially during July and August, is a strong factor in determining yield and quality of Niagara fruit crops.

Table 36 gives the actual rainfall during the growing period May 1 to September 30, for the past 20 years. The figures in *italics* denote the greatest total rainfall for each of five "summer" months in the 20-year period. Figures in **bold-face** type denote monthly totals of rain arbitrarily considered to be of little or no use to tree-fruit crops. Such rainfall, totalling so little for the month, generally comes in fractional amounts and, due to high summer temperatures and drying winds, is mostly lost by evaporation. In 1947, for example, the 1.47 inches of rainfall in August hardly penetrated the surface of the soil.

In 1947, as a result of this low August rainfall, plus low rainfall during the succeeding months, the subsoil became quite dry. This was followed in 1948 by a 14-week dry period from June to September. This chain of events produced a crop of the smallest-sized fruit we have had in many years. Also, as a result of this prolonged dry period, many thousands of trees died or were severely injured.

In the last twenty years the lowest monthly "summer" rainfall was 0.29 inches in May, 1934, and the highest was 9.28 inches in September, 1945.

Snow. A lack of snow cover is a serious fault of Niagara winters. The often-exposed surface permits serious drying-out of the soil and deep penetration of frosts, particularly when such frosts are accompanied by high winds.

Despite the lack of a *continuous* cover, there is considerable snowfall each winter. The winters of 1935-36; 1938-39 through to 1942-43; 1944-45; and 1945-46, were exceptional, each with more than 50 inches of snow. The heaviest snowfall was 69.75 inches during the winter of 1944-45, of which 43.75 inches fell in December, 1944.

In arbitrary ten-year periods the record shows the following winter means of snowfall: 31.25 inches for 1918-19 to 1927-28; 32.68 inches for 1928-29 to 1937-38; and 52.33 inches for 1938-39 to 1947-48. There has been no similar variation of the rainfall means for the same ten-year periods. The last ten-year period, 1938-39 to 1947-48 shows a very marked increase in snowfall with seven out of the ten winters having more than 50 inches of snow. The automobile and snow-plowed roads have helped to create an illusion of lower rather than increased snowfall in recent times.

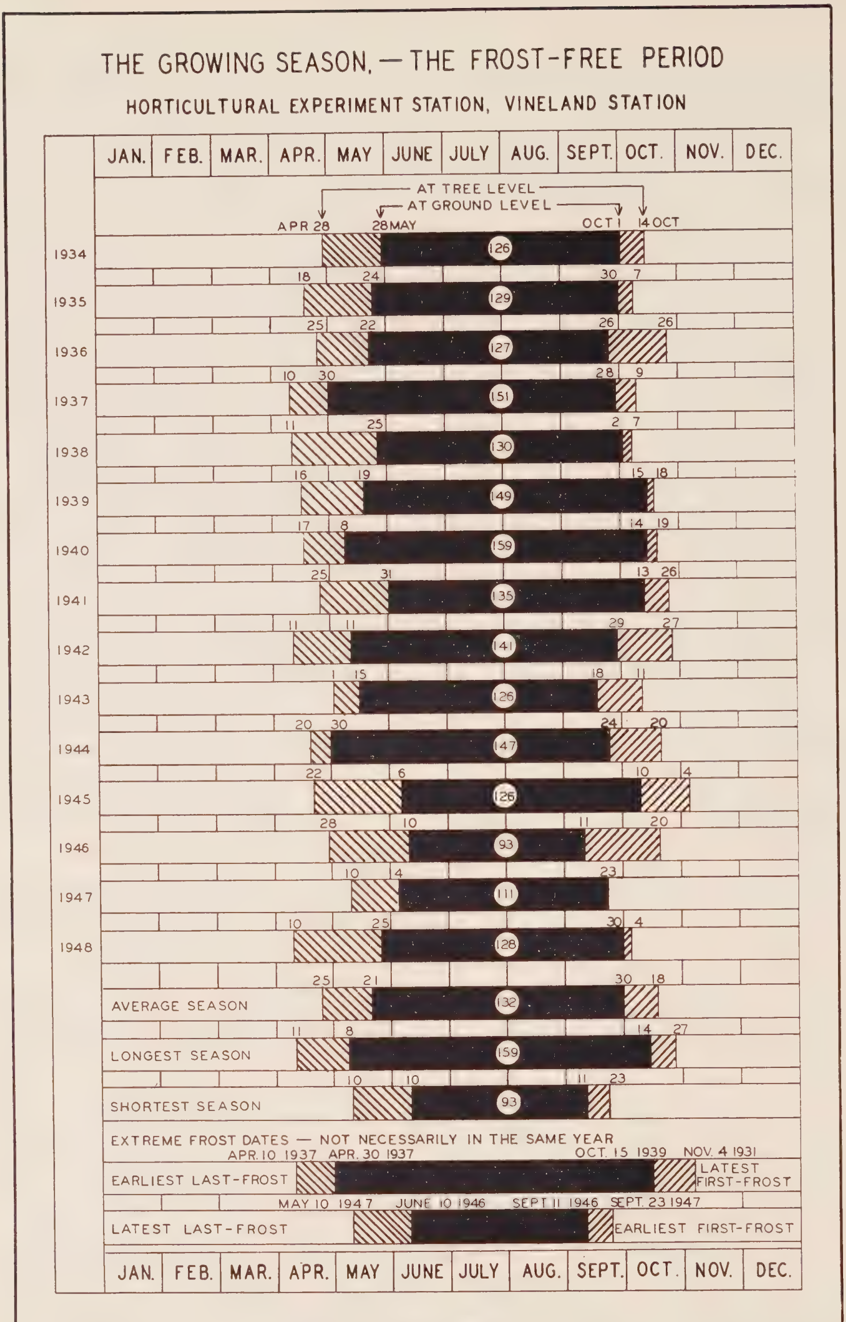

FIG. 25. This chart indicates two frost-free periods. The solid black bars indicate the frost-free period on the ground, which would govern most spring-planted crops. The diagonally-marked bars indicate the frost-free period at "tree" level, or about four feet above the ground. Trees and plants blooming at, and above this level, would generally be safe from frost on the date indicated. The numbers within the small circles indicate the length of the growing season at ground level. Our "average" season would commence on May 21 and close on September 30, an interval of 132 days.

TABLE 36. RAINFALL DURING THE GROWING SEASON, 1929-48

Year	May	June	July	August	September	Total
	inches	inches	inches	inches	inches	inches
1929	1.80	2.29	2.90	**0.91**	2.28	10.18
1930	1.92	2.60	2.31	**0.65**	2.32	9.80
1931	2.33	2.96	2.23	2.81	3.32	13.65
1932	4.31	1.97	*5.76*	2.03	2.95	17.02
1933	2.67	2.71	**0.65**	4.94	1.74	12.71
1934	**0.29**	2.34	**0.66**	2.37	4.46	10.12
1935	3.27	3.14	**0.36**	**1.20**	1.78	9.75
1936	1.58	2.85	**0.94**	**1.04**	4.37	10.78
1937	3.13	4.20	**1.31**	**0.91**	2.33	11.88
1938	2.08	**1.06**	4.15	*4.05*	2.97	14.31
1939	**1.19**	1.92	3.06	3.86	2.60	12.63
1940	4.25	3.80	2.84	2.44	3.56	16.89
1941	**0.97**	1.99	2.53	2.32	**0.49**	8.30
1942	*6.06*	1.76	3.47	**1.13**	3.54	15.96
1943	5.17	2.95	1.80	2.25	**1.36**	13.53
1944	2.92	2.74	3.36	2.90	2.90	14.82
1945	4.99	5.02	2.53	1.50	*9.28*	23.32
1946	3.10	1.71	1.64	2.84	1.94	11.23
1947	3.54	*5.05*	2.36	**1.47**	2.82	15.24
1948	3.47	2.89	**1.03**	**0.96**	1.83	10.18
20-yr. Mean	2.95	2.80	2.29	2.13	2.94	13.11
33-yr. Mean 1916-48	2.86	3.09	2.60	2.28	2.75	13.57

Frost-free Days.

The number of frost-free days at this Station has been calculated on the basis of two levels—at ground level; and at tree level, or about four feet above the ground.

The mean frost-free period at ground level is 132 days, with a low of 93 days in 1946, and a high of 159 days in 1940. The mean frost-free period at tree level is 177 days, with a low of 136 days in 1947, and a high of 199 days in 1942.

If an "average" can be calculated from such data as given in Fig. 25 the frost-free period for ground crops begins on May 21 and ends on September 30; for tree crops it begins on April 25 and ends on October 18.

For most spring-planted crops, and for some low-growing perennial crops such as strawberries, the temperature at ground level is most important. In this district the planting of tomatoes is well underway by May 24th. From the data here presented the hazard of planting before May 21st is two to one against being successful.

Sunshine.

The mean of hours of sunshine at Vineland is 2021 hours, with a low of 1828 hours in 1926, and a high of 2167 hours in 1946.

Some Weather Highlights.

1913-14. The peach crop was a total failure. There were many dips below zero, with a low of -13°F on February 13.

1917-18. Again the peach crop was a total loss with all fruit buds frozen. It was 16 degrees below zero on February 5.

1926-27. A very wet fall with a sudden freeze in November, just after a period of heavy rains. The following spring thousands of trees died from frost injury to the trunk just above the ground level.

1929. The summer was cool.

1931. A perfect season with no really excessive temperatures, and a fairly even distribution of rain.

1933-34. A severe freeze of 14 degrees below zero on February 10 killed many fruit buds, loosened bark from cherry and plum trees, and killed trees of many tender varieties. Baldwin apple trees which had fruited in 1933, were almost a complete loss throughout the Province. In the Niagara and other districts, a million or more trees were killed.

1935. The summer temperatures were lower than usual. It was fairly dry from July to October.

1936. Twenty-five inches of snow in March. Remember March 17? Oppressive hot and dry periods in July and August with very high temperatures; the week of July 8 to 14 was the hottest on record. The temperatures were: 101.5, 101.8, 103.4, 98.9, 90.8, 100.4, 89.0 respectively.

1937. The spring was wet with low temperatures in April. The blossom season was late, and the summer was below normal in hours of sunshine. Peaches and grapes were late in maturing.

1938. Quite an unusual year. In July and August there was a total of 8.2 inches of rain, followed by a fairly dry fall.

1939. Most unusual—a "normal" season.

1940. A wet season, and the coolest on record. Also, the longest growing season on record at Vineland—May 8 to October 14, or 159 days.

1941. The spring was warm and early. The summer was warm and dry. This year had the lowest total precipitation on record, 22.22 inches, 7.7 inches below normal.

1942. The spring was very wet with 6 inches of rain in May.

1943-44. Severe peach bud-killing with a temperature of 13 degrees below zero on February 15.

1944. There was an even distribution of rain during the growing season. In December there were 43 inches of snow, with 26 inches of this on December 11 alone.

1945. Blossom time was early but, because of cool weather, insects were not active. The rainfall was the highest on record, 39.17 inches, 13.61 inches above normal. September rainfall was 9.28 inches.

1946. The shortest growing season on record. The last ground-frost in the spring was on June 10, and the first ground-frost in the fall was on September 11—a total of 93 days.

1947. The fall was dry. The subsoil had practically no moisture.

1948. The spring rains were not sufficient to fill the dry subsoil resulting from the previous fall. Also, there were fourteen weeks of very dry weather from June to September. On the heavier soils many trees lost one-half to three-quarters of their leaves in August, and many of these trees subseqently died.

FRUIT AND VEGETABLE BREEDING

NEW PROJECTS (1944-48)

Cucumber 2. BREEDING FOR RESISTANCE TO BACTERIAL WILT (*Erwinia tracheiphila*). (*E. A. Kerr, D. L. Bailey*). 1944.

Cucumber strains showing an appreciable degree of resistance to bacterial wilt were obtained from the United States Department of Agriculture under the numbers G12, G207 and G219. These were crossed with the varieties Marketer and Straight 8. Controlled backcross and self pollinations are being made. Since all these cucumbers will succumb if artificially inoculated, natural means are depended on for the spread of the disease.

Sweet Corn 2. PRODUCTION AND TESTING OF EXPERIMENTAL SWEET CORN HYBRIDS. (*E. A. Kerr*). 1947.

Most of the better sweet corn inbreds developed by Experiment Stations in the United States have been obtained. These are being crossed *inter se* and with inbreds produced at this Station. Tests at the present time are limited to a single row.

Sweet Corn 3. DEVELOPMENT OF SWEET CORN INBREDS (*E. A. Kerr*). 1947.

Selfing and backcrossing methods are being used to produce a series of superior inbreds having maturity dates from very early to very late. High quality as well as high production is being stressed in this work. It is planned to incorporate in these inbreds such easily identified genetic plant characters as purple midrib. This will simplify the task of rogueing production plots, and will provide a check on the effectiveness of isolation and detasselling.

Tomato 5. BREEDING FOR RESISTANCE TO SEPTORIA LEAF SPOT (*Septoria lycopersici*). (*D. L. Bailey, E. A. Kerr*). 1944.

In co-operation with the University of Toronto, hybridization and selection work has been initiated to introduce the resistance of *L. hirsutum* and *L. pimpinellifolium* #112215 into a commercial type.

Tomato 6. IMPROVEMENT OF VARIETIES OF TOMATOES FOR PROCESSING. (*E. A. Kerr*). 1946.

The main objective is the development of a productive variety that will be as early as, or earlier than John Baer, and have better quality. The genetic factor "jointless" is being used in some of this work.

Tomato 7. THE USE OF F_1 HYBRID SEED IN TOMATO PRODUCTION. (*E. A. Kerr, O. J. Robb*). 1946.

This project has three main divisions (1) tomatoes for processing, (2) early market tomatoes, and (3) greenhouse tomatoes. Two replications are grown in the preliminary trials of the hybrids for processing.

Eight replications are used in the advanced trials. Any hybrid which, in these preliminary trials, appears to have promise as an early market tomato, is then grown on stakes. Only a few hybrid tomatoes have yet been tested in the greenhouse. This division of the project will be expanded when varieties stabilized for immunity from leaf mould are available as parents.

DISTRIBUTION OF STATION VARIETIES AND SELECTIONS

Accompanying tables show 1947 and 1948 distribution of Station originations, both named and selections still under test. Extensive distribution of most Station varieties is made in the first year or two after introduction. Later distribution as shown in Table 37 is quite limited once nurseries list the varieties.

The distribution of numbered Station selections (Table 38) is primarily a service rendered the Station by co-operating growers. Many growers are willing and anxious to assist in the evaluation of selections thought to have promise for commercial purposes.

TABLE 37. DISTRIBUTION OF STATION FRUIT VARIETIES, 1947 AND 1948

Kind and Variety	Grower Distribution		Nursery Distribution	
	No. of Contacts	Buds, Scions	No. of Contacts	Buds, Scions
Cherry				
Velvet	3	85	2	1250
Vernon	4	80	—	—
Victor	7	175	2	1250
Peach				
Erlyvee	16	850	1	200
Valiant	3	250	1	200
Vanguard	21	1645	5	950
Vedette	2	112	4	1700
Veefreeze	4	50	1	400
Vesper	1	50	5	640
Veteran	7	330	6	1800
Strawberry		Plants		
Valentine	21	575	—	—
Vanrouge	1	25	—	—
Raspberry				
Vandyke	1	25	—	—
Viking	1	25	—	—

TABLE 38. DISTRIBUTION OF NUMBERED STATION SELECTIONS 1947 AND 1948

Kind	Number of selections	Total Trees Plants	Total Buds Scions	No. of Contacts
Cherry, 1947	3	—	525	3
Cherry, 1948	5	—	2410	8
Peach, 1947	11	5	1015	25
Peach, 1948	15	14	1045	23
Pear, 1947	1	—	125	1
Grape, 1947	19	62	490	9
Strawberry, 1947	5	120	—	8
Strawberry, 1948	7	620	—	28
	66	821	5610	105

CHERRY BREEDING

The primary objective in cherry breeding has been to obtain a seasonal succession of firm, dark-fleshed, non-cracking, sweet cherries, commercially acceptable, and satisfactory as to orchard performance.

Probably no present commercial variety is entirely satisfactory. Some are too soft-fleshed to hold up under shipping. Others split too readily in adverse weather. Still others are insufficiently dark in colour, either outwardly or in flesh; and orchard performance is often indifferent in one or more ways. There is a particular need for acceptable varieties to extend the season, both earlier and later.

Cherry breeding was first started at Vineland in 1915 with the planting of open-pollinated seed of two sour and one duke varieties. This

TABLE 39. CHERRY BREEDING. 1917-48*. CROSS-POLLINATED SEEDLINGS

Family Number	Parentage		Seeds Planted	Nursery Trees	Field Trees	Total Sel's	Selections 1948
1701	B. Tartarian	x Napoleon	18	3	3	0	0
1702	Montmorency	x Napoleon	106	32	24	0	0
1703	Napoleon	x B. Tart.	25	9	9	0	0
1704	Olivet	x Windsor	13	2	1	0	0
1705	Windsor	x B. Tart.	19	1	1	0	0
1706	"	x Rockport	16	0	0	0	0
1801	B. Tartarian	x Napoleon	0	0	0	0	0
1802	"	x Republican	125	38	9	0	0
1803	"	x Windsor	0	0	0	0	0
1804	"	x Self	0	0	0	0	0
1805	Windsor	x Tomentosa	12	0	0	0	0
1806	"	x Self	0	0	0	0	0
2701	Bing	x Windsor	1900	101	66	7	5
2702	"	x Schmidt	600	256	48	4	4
2801	"	x Windsor	400	9	4	1	0
2802	"	x Schmidt	450	15	48	0	0
2803	"	x Napoleon	100	2	2	0	0
2804	"	x B. Tart.	400	0	0	0	0
2805†	Early Purple	x B. Tart.	328	—	—	—	—
2806	"	x Napoleon	520	—	—	—	—
2807	"	x Schmidt	365	—	—	—	—
2808	"	x Windsor	186	—	—	—	—
2809	"	x Y. Spanish	153	—	—	—	—
3101	Bing	x B. Tart.	1020	380	41	0	0
3102	"	x Napoleon	30	5	2	1	1
3103	"	x Victor	1555	727	138	7	7
3501	Hedelfingen	x B. Tart.	790	163	114	7	4
3502	"	x Bing	745	193	61	11	7
3503	"	x Victor	300	96	75	9	8
3504	"	x Windsor	770	564	350	42	29
4201	Sel. 270115	x Giant	224	12	4	—	—
4202	"	x Hedelfingen	214	41	23	—	—
4203	"	x Sweet Sept.	11	1	1	—	—
4204	"	x Velvet	495	31	29	—	—
4205	"	x Victor	310	17	10	—	—
4206	"	x 160128 (Sel.)	187	17	6	—	—
4207	"	x 160140 (Sel.)	88	10	10	—	—
			12475	2725	1079	89	65

* Year of breeding is indicated in the family number, (col. 1). 1701 is year 1917 breeding; 1801, year 1918, etc.

† Non-viable seed. See page 63.

was followed in 1916 with the planting of a further considerable quantity of open-pollinated seed—three sweet and two duke varieties. The first crosses between varieties were made in 1917 and hybridizing has been continued, intermittently, since then.

Table 39 lists the cross-pollinated material, noting the extent of the work and the results in terms of selections. Similar information for the open-pollinated material is given in Table 40.

TABLE 40. CHERRY BREEDING. 1915-48*. OPEN-POLLINATED SEEDLINGS

Family Number	Parentage	Seeds Planted	Nursery Trees	Field Trees	Total Sel's	Selections 1948
1501	English Morello	2500	21	1	0	0
1502	Late Duke	2800	15	5	0	0
1503	Montmorency	6000	45	10	0	0
1601	Windsor	3503	157	78	10	5
1602	B. Tartarian	2059	121	21	5	1
1603	Napoleon	3120	776	138	4	1
1604	Late Duke	620	50	26	0	0
1605	Reine Hortense	415	7	6	0	0
1707	B. Republican	1434	109	43	0	0
1708	B. Tartarian	423	72	40	0	0
1709	May Duke	1160	6	5	0	0
1710	Napoleon	1179	156	70	0	0
1711	Windsor	1696	66	48	0	0
1807	B. Tartarian	260	50	45	0	0
1808	Bing	138	6	1	0	0
1809	Early Richmond	275	1	1	0	0
1810	Late Duke	890	174	63	0	0
1811	Montmorency Short Stem	390	54	10	0	0
1812	Napoleon	900	126	63	0	0
1813	Republican	1620	46	39	0	0
1814	Windsor	2581	102	51	0	0
1901	B. Tartarian	790	107	12	0	0
1902	Napoleon	800	17	17	0	0
1903	Prunus avium	1200	162	33	0	0
1904	Baldwin	780	146	50	0	0
1905	Early Richmond	500	54	54	0	0
1906	Late Duke	110	34	34	0	0
2201	Bing	555	48	46	2	1
2202	Lambert	380	42	40	1	1
2901	Schmidt	1300	260	140	5	3
2902	Windsor	1400	214	140	3	2
4801	35024 (Hedelfingen x Bing)	265	—	—	—	—
4802	350435 " x Windsor	480	—	—	—	—
4803	35016 " x B. Tart.	200	—	—	—	—
		42723	3244	1330	30	14

* Year of breeding is indicated in the family numbers (col. 1). 1501 is year 1915 breeding; 1601, year 1916, etc.

Three selections from the earlier (1916) work have been named and introduced, Velvet, Vernon and Victor. Brief descriptions follow:

Velvet (160119). An open-pollinated seedling of Windsor introduced in 1937. The fruit is large, dark-fleshed, maturing after Windsor or about with Hedelfingen. In freezing tests at the Ontario Agricultural College, Guelph, Velvet was ranked high for that purpose. In orchard tests, both of the original tree and trees propagated from it, heavy cropping was a notable characteristic. Later, however, possibly due to virus, the yield has been most disappointing both in the Station orchard and with commercial growers. Therefore it is not now recommended for planting.

FIG. 26. Victor sweet cherry, introduced in 1925. This variety, although white-fleshed, steadily gains in favour with grower and consumer alike.

Vernon (160133). A Windsor (open-pollinated) seedling, introduced in 1937. The fruit is large, dark-fleshed, firm and of good quality, maturing about with Bing and, under Ontario conditions, less susceptible to cracking than that variety. It is a heavy cropper. In British Columbia, at Summerland, it is described as "Somewhat inferior to Bing in size, firmness and quality. Very susceptible to cracking. A heavy and consistent cropper." The difference as regards susceptibility to cracking under different climatic conditions is of interest.

Victor (160138). An open-pollinated seedling of Windsor, introduced in 1925. The fruit is large, light-fleshed, firm, somewhat acid until fully ripe, then of good quality. The pit is unusually small. Victor matures slightly before Napoleon, but has better crop distribution on the tree and therefore is less inclined to rot in wet seasons. Also it is more attractively colored than Napoleon, the white ground-colour being well covered with lively red. The fruit processes well.

In addition to the three introductions, 116 selections [89 from cross-pollinated material (Table 39), and 27 from open-pollinations (Table 40)], have been made from time to time. Seventy-nine of these, listed below with brief notes, are still under observation in Station orchards. A very few have been propagated for grower tests. All 79 have been propagated in some degree in order that final judgment may not be limited to performance of the original seedling tree.

In the brief descriptive notes, generally there is no reference to tree characters. It may be assumed that only seedlings at least reasonably satisfactory in this respect have been selected for further trial.

Group A Selections. Light-fleshed Seedlings (see Tables 39 and 40 for parentages).

Selection	
29021	Fair quality, acid, soft, shiny, early.
31021	Good quality, attractive, medium size, mid-season.
31033	Good quality, attractive, firm, good size, late.
31034	Very similar to Victor, possibly earlier.
31035	Good quality, bright, large, mid-season.
350211	Good quality. Best-texture white for freezing. Large, mid-season.
35035	Fair quality, medium size, mid-season, heavy cropper.
35037	A sweet Victor, early.
35039	Fair quality, bright colour, good size, mid-season.
35048	Good quality, attractive, good size, early mid-season.
350432	Good quality, attractive, firm, good size, late.

Group B Selections. Dark-fleshed Seedlings (see Tables 39 and 40 for parentages).

Selection	
160128	Good quality, medium firm, heavy producer.
160131	"Woody" texture, cracks at blossom end, late.
160139	Good quality, medium size, firm, late.
160140	Good quality, firm, mid-season, hangs well.
160145	Good quality, medium firm, mid-season.
160228	Fair quality, soft, large, early, shy bearer.
16032	Only fair quality, medium firm, early, good cropper.
22013	Good quality, juicy, large, late.
220211	Good quality, large, firm, late.
27016	Good quality, large, shiny, firm, late.
27019	Good quality, medium size, firm, late. Fruit scattered on tree.
270114	Good quality, large, firm, late. May be light cropper.
270115	Fair quality, very large, crop variable.
270118	Good quality, medium size, late.
27021	Good quality, meaty, good size, medium-early.
27026	Woody texture, good size, very late.
270215	Fair quality, medium size, firm, early, doubtful cropper.
270216	Good quality, medium size, mid-season.
29011	Good quality, meaty, medium size, mid-season, doubtful cropper.
29015	Good quality, large, good size, doubtful cropper.
290124	Good quality, medium size, late.
29023	Good quality, meaty, medium size, mid-season.
31031	Good quality, good size, stems separate without tearing fruit.
31032	Good quality, medium size, mid-season.
31036	Good quality, good size, late.
31037	Good quality, good size, mid-season.
35013	Acid, soft, medium size, early.
35015	Good quality, firm, good size, mid-season.
35016	Woody flesh, good size, very late.
35017	Fair quality, firm, medium size, very late.
35021	Good quality, large, firm, early mid-season, doubtful cropper.
35023	Fair quality, a bit woody, good size, late.
35024	Good quality, mild flavour, meaty, large, early mid-season.
35028	Fair quality, firm, large, medium late, stems separate without tearing fruit.

35029	Good quality, large, attractive, mid-season.
350210	Black Tartarian type, firm, doubtful cropper.
35031	Fair quality, a bit acid, attractive, large, early mid-season.
35032	Fair quality, medium large, early mid-season.
35033	Fair quality, good size, stems long, early mid-season.
35036	Acid, small, stems separate without tearing fruit, mid-season.
35038	Good quality, firm, attractive, large, mid-season.
35041	Fair quality, bright finish, medium size, good crop distribution.
35042	Good quality, attractive, firm, good size, consistent cropper.
35043	Acid, attractive, medium firm, large, mid-season.
35044	Good quality, raisin-like texture, early mid-season, light cropper.
35045	Fair quality, attractive, good size, mid-season, doubtful cropper.
35049	Fair quality, somewhat woody, medium size, mid-season.
350411	Fair quality, bright finish, firm, good size, mid-season.
350412	Good quality, attractive, medium size, mid-season.
350413	Good quality, firm, meaty, medium size, mid-season, light cropper.
350415	Fair quality, firm, medium size, mid-season.
350417	Good quality, firm, medium size, mid-season, light cropper.
350418	Good quality, good frozen, attractive, good size, mid-season.
350419	Good quality, medium size, mid-season, light cropper.
350421	Good quality, nice texture, large, mid-season, moderate cropper.
350423	Good quality, meaty, attractive, late, light cropper.
350424	Fair quality, a bit woody, late mid-season, light cropper.
350425	Fair quality, below medium size, late.
350426	Good quality, medium size, late.
350427	Good quality, good size, mid-season, good cropper.
350428	Good quality, firm, good size, late, fair cropper.
350430	Good quality, firm, medium size, mid-season.
350431	Fair quality, firm, medium size, mid-season, light cropper.
350439	Good quality, has shown up well in a poor location, late.
350435	Fair quality, firm, medium size, late.
350436	Fair quality, firm, medium size, late.
350437	Good quality, firm, medium size, late.
350438	Fair quality, firm, medium size, late.

The selections and introductions represent the tangible results of the cherry breeding program in terms of new, or potentially new, varieties. There is a further result in several observations which may have some value to others interested in cherry breeding.

1. *Fruits may mature without developed embryos.* Early in the cherry breeding work it was noted that, when cleaning the pits preparatory to planting, a proportion of them floated. Planted separately, "floaters" failed to germinate whereas the "sinkers" germinated well. Later cracking tests showed, as may be expected, that all the pits which floated had undeveloped kernels. In some there would be only small pieces of desiccated tissue, whereas there had been, in others, considerable development.

In early-maturing varieties *all* pits were floaters. In later-maturing varieties the picture was better, varying with variety and season. In some varieties, in fact, there were comparatively few floaters. Unfortunately no precise record was made, at the time, of the percentage of good and bad pits for a given parentage.

It will be noted in Table 39 where Early Purple was used as the seed parent (parentages 2805 to 2809) that no seedlings resulted. From

5430 pollinations 1552 seeds were obtained but as all were floaters, and as cracking tests confirmed the fact that none had properly developed kernels, all were discarded.

Black Tartarian, another early variety used as a seed parent, did give some viable seed but the percentage was generally low, and varied greatly. This variation might be due to differing seasonal conditions; or it might be that, in some seasons, the fruit was harvested prematurely.

In breeding for earliness in sweet cherries the simple procedure is to use the early varieties as pollen parents only. An alternative would be to attempt to "culture" the embryos of early varieties as is now done with peaches.

2. *No intermediates in season, in a late variety x early variety cross.* In 1935 Hedelfingen, a late, firm, dark-fleshed variety, was crossed with Black Tartarian, an early, soft-fleshed variety. The primary objective was early- and mid-season firm-fleshed varieties. Some fruit data was secured from 88 of the 114 trees planted in the orchard. This data is as follows:

Early		Mid-season		Late	
Soft	Firm	Soft	Firm	Soft	Firm
47	9	0	0	2	30

The absence of season intermediates, and the strong association of earliness and soft flesh (as in B. Tartarian), and lateness and firm flesh (as in Hedelfingen), are explained by a geneticist as follows:

The data submitted indicate that the differences in season and texture between Hedelfingen and Black Tartarian are each controlled by a single major factor (other data indicate there are also modifying factors) and that the genes for these factors are located on the same chromosome 12.5 cross-over units apart. This means that, on the average, the original combination of genes will break up to form a new combination 12.5% of the time. One of the varieties is homozygous recessive for them; the data do not indicate which is which. If progeny resulting from self-pollination of the heterozygous variety could be obtained, four types would appear, namely, early soft, early firm, late soft, and late firm. Progeny obtained in the same way from the homozygous recessive parent would resemble that parent with respect to the two characters, season and texture.

3. *Winter hardiness.* Bing, although apparently hardy as an orchard tree, has the reputation for being rather tender as a nursery tree. This lack of hardiness seems to occur in Bing seedlings, and whether Bing is used as the seed or the pollen parent.

However, the most convincing evidence of this lack of hardiness occurred where Bing was used as the pollen parent. In 1935, the pollen of four varieties, Bing, Black Tartarian, Victor, and Windsor, was used on different limbs of a tree of Hedelfingen. The seedlings from these crosses were planted in parallel nursery rows in the spring of 1937 in an area where the soil and other conditions were uniform. Apart from a few deaths during the summer in each parentage, all crosses made good growth in 1937, and no variations in behaviour were noted. The winter of

1937-38 was severe and in the spring it was noted that some winter injury had occurred to these seedlings. Counts made April 18 were as follows:

Cross (1935)	Trees in Nursery	Number Dead Spring 1938	Percent Dead
Hedelfingen x Bing	171	65	38.0
" x B. Tartarian	149	6	4.0
" x Victor	91	3	3.3
" x Windsor	520	59	11.4

The severe winter of 1933-34 had also caused considerable losses in cherry seedlings, again in the nursery row. Bing was the seed parent in this case, with, unfortunately, no other variety for comparison. However, having in mind the later (1937-38) experience these earlier losses in Bing seedlings may be significant. These were as follows:

Cross (1931)	Trees in Nursery	Number Dead Spring 1934	Percent Dead
Bing x B. Tartarian	380	339	89.2
" x Victor	727	589	81.0

4. *Skin and flesh colour.* One reason Victor sweet cherry is liked by both grower and consumer, is its attractive appearance. The fruit, when properly mature, has "eye" appeal. In spite of the prejudice against white-flesh varieties, Victor sells readily on the open market, in competition with the dark-flesh varieties.

In breeding, the glossy Victor finish shows up in many of its seedlings, both dark-fleshed and light-fleshed. And, as might be expected, many of Victor's progeny have light-colored flesh like Victor itself.

Skin colour, in the light-flesh seedlings, was sometimes so well blushed as to rate light red to red. In seedlings of Bing x Victor (1931) for example, of the 103 seedlings which fruited in 1941, eleven of the 55 "light" skin, or "white" seedlings, were classed as light red to red. (The remaining 48 were dark skin, dark flesh.) In the cross, Hedelfingen x Victor (1935), there were 25 dark-skin, dark-flesh seedlings, and 33 light to red skin with light-colored flesh. In these two crosses, with Victor as the pollen parent, the number of light-colored and light-fleshed fruits, was about the same—53.4 percent for Bing x Victor, and 56.9 percent for Hedelfingen x Victor.

5. *Varying yields.* Ability to yield well and consistently is probably *the* primary consideration in evaluating seedlings. A seedling, good in all other respects, is of no commercial value unless it yields well.

Bloom is not necessarily a measure of subsequent yield. In the Station breeding work it has often been observed and recorded that some seedling trees, although blooming freely year after year, yet set only light crops. Neighboring sister trees, under the same conditions of soil, season, pollination, etc., will fruit comparatively well. It is believed that adverse weather at blooming time is a factor, that some seedlings are better able to set fruit than others, under cool, wet conditions.

Since adverse weather conditions are a common occurrence in cherry bloom time in the Niagara District, this ability to set fruit under such circumstances is an important consideration in selecting seedlings.

FIG. 27. Grape seedling 29186. This red-fruited seedling of Brocton is the most promising selection from the earlier breeding work. It has been propagated sufficiently for semi-commercial test.

GRAPE BREEDING

In the Station Report of 1942 a summary was given of the extent of the grape breeding work from 1913 to 1937. This present report gives in some detail the work done during that period, and also in subsequent years.

As listed in the 1942 Report the titles of the 1913 to 1937 grape breeding projects are:

Project 1. Improvement in table varieties.

Project 2. Wine grapes for Ontario conditions.

Grape breeding was started in 1913. The main objective at that time was a productive, self-fertile, high-quality, red variety that could be shipped to western provinces. Also there was interest in a late-keeping, red, or blue grape, that might be stored to lengthen the normal grape season. A moderately thick-skinned variety which would not shell was required for this purpose.

Most of the earlier breeding work was lost through unsuitable soil conditions for the small seedlings. Later, with suitable soil, 26,000 vines from seed obtained in pollination experiments, were set out in a fruiting plantation in the spring of 1919. Since a pollination study was the source of seed, many of the seedlings were from self-unfruitful varieties such as Herbert, Lindley, Massasoit, Salem, Wilder, and Barry, crossed with viable-pollen varieties, including Concord, Niagara, Campbell and Worden.

It was hoped that a further cross of the part-*vinifera* Rogers' hybrids (Herbert, Lindley, etc.) with the hardier, more disease-resistant varieties of North American origin would produce desirable new varieties of better quality than Concord, Niagara, and similar varieties.

By 1929 more emphasis was being placed on the breeding of better varieties for wine purposes since, by that time, the great bulk of the grape crop was being used by the wineries.

Although, as yet, there have been no Station introductions from the grape-breeding program, much information has been obtained on the behaviour of various varieties as parents. Some of the more recent breeding, 1935 to 1937, has given many seedlings of considerable promise. These have been propagated for more extensive trial than provided by the original seedling vine.

It is difficult to determine the breeding value of all the varieties used. However, one result that stands out is that the main commercial varieties, Concord and Niagara, have not been productive of good seedlings, either as male or female parents. Also, Ontario was useless as a seed parent as the seeds failed to germinate. Seedlings from self-pollinations generally have been inferior.

Some of the varieties that have been above average as parents are Brocton, Herbert, Golden Muscat, Lomanto, and Seneca. The last three particularly, gave more selections of promise than any of the earlier work.

TABLE 41. SUMMARY OF BREEDING FOR IMPROVEMENT IN TABLE VARIETIES OF GRAPES. PROJECT 1, 1913 TO 1922

Family No.	Parentage	No. Seeds	No. Vines	No. Selections
1302	Agawam x Campbell		81	0
1533	Agawam x Campbell	157	45	0
1632	Agawam x Campbell	1155	286	0
1301	Agawam x Concord		72	0
1527	Agawam x Concord	1388	370	0
1631	Agawam x Concord	825	318	0
1719	Agawam x Concord	533	40	0
1304	Agawam x Niagara		60	0
1528	Agawam x Niagara	1293	476	1
1630	Agawam x Niagara	572	259	3
1720	Agawam x Niagara	760	173	1
1303	Agawam x Worden		170	2
1629	Agawam x Worden	891	342	0
1717	Agawam x Worden	700	127	1
1464	Agawam x Self	16608	173	1
1599	Agawam x Self	250	32	0
1665	Agawam x Self	487	78	0
1328	Aminia x Self		80	1
1330	Banner x Self		167	0
1309	Barry x Concord		51	0
1429	Barry x Concord	1872	79	0
1308	Barry x Worden		79	0
1326	Barry x Self		425	0
1635	Brighton x Campbell	3465	2567	6
1633	Brighton x Concord	3465	1720	1
1634	Brighton x Worden	3300	2126	2
1572	Caco x Self	40	26	0
1656	Caco x Self	544	90	0
1811	Campbell x Agawam	150	50	0
1601	Campbell x Delaware	242	162	0
1604	Campbell x Diamond	385	108	1
1602	Campbell x Lincoln	1342	360	3

Family No.	Parentage	No. Seeds	No. Vines	No. Selections
1603	Campbell x Winchell	990	504	3
1812	Campbell x Winchell	220	51	0
1813	Campbell x Worden	520	89	0
1465	Campbell x Self	23804	174	0
1653	Campbell x Self	937	354	0
1327	Catawba x Self		537	0
1467	Champion x Self	18216	469	1
1329	Champion x Self		266	0
1646	Champion x Self	660	267	0
1618	Chasselas avec Royal x Concord	44	36	1
1619	Chasselas avec Royal x Niagara	82	36	0
1803	Concord x Campbell	60	34	0
1613	Concord x Delaware	110	36	0
1614	Concord x Diamond	112	42	0
1615	Concord x Lincoln	139	42	0
1804	Concord x Worden	440	189	0
1321	Concord x Self		230	0
1463	Concord x Self	29580	106	0
1659	Delaware x Self	318	90	0
1666	Diana x Self	330	60	0
1657	Early Ohio x Self	165	78	0
1583	Green Early x Self		271	0
1650	Green Early x Self	1142	564	0
1662	Hartford x Self	319	90	0
1412	Herbert x Campbell	1980	145	0
1640	Herbert x Campbell	1130	767	2
1709	Herbert x Campbell	1040	305	5
1642	Herbert x Concord	1320	890	2
1411	Herbert x Concord	1116	155	0
1643	Herbert x Niagara	2145	1048	1
1641	Herbert x Worden	1650	1312	2
1324	Herbert x Self		447	2
1466	Herbert x Self	10564	1017	0
1325	Hicks x Self		451	0
1663	Hicks x Self	165	78	0
1620	Iona x Winchell	222	84	0
1586	Iona x Self	128	79	
1660	Isabella x Self	291	160	0
1661	King x Self	165	78	0
1339	Lady x Self		640	0
1655	Lincoln x Self	589	274	0
1316	Lindley x Campbell		145	0
1403	Lindley x Campbell	900	54	0
1536	Lindley x Campbell	416	264	0
1644	Lindley x Campbell	317	251	0
1714	Lindley x Campbell	330	120	0
1401	Lindley x Champion	504	81	0
1318	Lindley x Concord		120	0
1402	Lindley x Concord	696	107	0
1538	Lindley x Concord	512	336	0
1542	Lindley x Niagara	482	263	0
1406	Lindley x Winchell	456	111	0
1315	Lindley x Worden		105	0
1541	Lindley x Worden	991	137	0
1713	Lindley x Worden	585	170	0
1333	Lindley x Self		783	0
1468	Lindley x Self	21336	1724	1
1664	Lucile x Self	660	392	0
1654	Lutie x Self	495	134	0
1590	Lutie x Self		104	0
1427	Massasoit x Campbell	720	45	0
1311	Massasoit x Concord		153	0
1426	Massasoit x Concord	792	147	0
1554	Massasoit x Delaware	600	122	0
1313	Massasoit x Niagara		36	0

Family No.	Parentage	No. Seeds	No. Vines	No. Selections
1428	Massasoit x Niagara	792	89	0
1312	Massasoit x Worden		172	1
1557	Massasoit x Worden	489	149	0
1470	Massasoit x Self	2160	167	0
1332	Massasoit x Self		403	1
1342	McPike x Self		533	0
1648	McPike x Self	495	180	0
1645	Moore Early x Self	660	240	0
1335	Moyer x Self		112	0
1805	Niagara x Agawam	115	58	0
1519	Niagara x Black Hamburg	63	32	0
1807	Niagara x Campbell	85	46	0
1523	Niagara x Campbell	354	157	0
1517	Niagara x Concord	318	66	0
1609	Niagara x Delaware	330	148	0
1610	Niagara x Diamond	473	264	1
1611	Niagara x Lincoln	1303	768	0
1612	Niagara x Winchell	1078	690	2
1806	Niagara x Winchell	325	121	0
1651	Niagara x Self	445	144	0
1322	Niagara x Self		590	0
1472	Niagara x Self	35422	82	0
1652	Pense Malaga x Self	1155	216	0
1595	Perkins x Self		215	0
1647	Pierce x Self	207	42	0
1649	Pocklington x Self	660	254	0
1638	Salem x Campbell	1980	1128	1
1704	Salem x Campbell	2000	487	2
1544	Salem x Concord	174	32	2
1636	Salem x Concord	1980	1195	1
1702	Salem x Concord	1565	240	1
1639	Salem x Concord	2145	764	0
1637	Salem x Worden	1980	270	0
1703	Salem x Worden	1485	409	2
1559	Vergennes x Campbell	1000	134	0
1560	Vergennes x Champion	920	284	0
1564	Vergennes x Concord	480	391	0
1561	Vergennes x Delaware	320	204	0
1562	Vergennes x Niagara	208	52	0
1563	Vergennes x Worden	284	180	0
1341	Vergennes x Self		290	0
1598	Vergennes x Self		730	0
1667	Vergennes x Self	6105	3814	0
1625	Wilder x Campbell	1155	750	3
1705	Wilder x Campbell	1545	56	0
1317	Wilder x Concord		45	0
1438	Wilder x Concord	2921	26	0
1627	Wilder x Concord	990	694	0
1706	Wilder x Concord	500	113	0
1553	Wilder x Niagara	92	38	0
1626	Wilder x Niagara	990	672	0
1708	Wilder x Niagara	700	228	0
1441	Wilder x Worden	1872	57	0
1628	Wilder x Worden	1618	1189	1
1707	Wilder x Worden	1025	400	1
1471	Wilder x Self	2244	151	0
1334	Winchell x Self		221	0
1658	Winchell x Self	660	180	0
1606	Worden x Lincoln	118	50	0
1607	Worden x Winchell	88	44	0
1340	Worden x Self		244	0
Various parentages of less than 25 vines each			3869	0
		257,982*	55,210	62

* Incomplete. No seed record of some parentages.

TABLE 42. SUMMARY OF BREEDING FOR IMPROVEMENT IN TABLE VARIETIES OF GRAPES. PROJECT 1, 1923 TO 1927

Family No.	Parentage	No. Seeds	No. Vines	No. Selections
2502	Agawam x Winchell	544	125	9
2503	Caco x Agawam	210	28	1
2504	Caco x Campbell	354	70	5
2506	Captivator x Agawam	202	5	1
2510	Captivator x Winchell	162	12	2
2511	Herbert x Agawam	851	100	0
2417	Herbert x Caco	718	154	3
2418	Herbert x Captivator	703	121	1
2512	Herbert x Patricia	490	105	3
2707	Herbert x Patricia		38	0
2709	Herbert x Winchell		2	1
2513	King Philip x Captivator	108	10	1
2514	King Philip x Winchell	206	44	7
2420	Lindley x Agawam	302	29	0
2307	Lindley x Caco	536	121	1
2308	Lindley x Captivator	397	44	0
2422	Lindley x 16181	770	121	2
2519	Patricia x Campbell	203	43	0
2520	Patricia x Winchell	235	26	0
2429	Salem x Caco	812	65	0
2430	Salem x Captivator	455	26	2
2522	Salem x Patricia	900	219	5
2524	Wilder x Patricia	658	205	1
2704	Wilder x Patricia		82	0
2432	Winchell x Agawam	1720	87	0
2433	Winchell x Caco	1348	190	0
2434	Winchell x Campbell	1477	172	1
2528	16033 x Self	317	9	4
2526	16123 x Self	250	8	1
2439	16181 x Captivator	472	146	1
		15,400*	2,407	52

* Incomplete. No seed record of three parentages.

Tables 41 and 42 are summaries of the breeding work carried out under Project 1, and covering the period 1913 to 1927. The "family" number is made up as follows: the first two digits indicate the year the cross was made; the second pair of digits represent the number of the cross in that particular year. Further digits, as used in the descriptions of selections beginning with 230777 below, refer to individual plant selections in the family. The other columns in the tables give information on parentages, the extent of the work in terms of seeds and vines, and the number of selections.

In parentages it will be observed that a given cross, as Agawam and Campbell, may have been made more than once. In the above case as an example, the 1913 cross was repeated in 1915 and 1916.

A study of Tables 41 and 42 show that there were relatively few selections from the earlier breeding work (prior to 1923) with its large seedling population. Proportionately, the work of 1923 and later produced more selections of promise. Specifically, 62 selections were made from the 55,210 seedlings of the 1913 to 1922 breeding (Table 41), while there were 52 selections from the 2497 seedlings of the 1923 to 1927 breeding (Table 42). Also, all 62 selections from the early work have since been discarded, while four selections from the later work are still under observation. Brief descriptive notes of these four are as follows:

230777, Lindley x Caco. A late red that ripens a few days after Concord. It has been a heavy yielder of medium to large, fine-looking bunches. The quality is only fair and wine tests have not been outstanding. Yield and appearance have been above average but it is doubtful if quality will warrant introduction.

2512102, Herbert x Patricia. This selection was saved for its fine-appearing compact bunches of large, blue grapes. It has cropped well. It is not a dessert grape, and a small wine test in 1948 was not outstanding. Probable discard.

251422, King Philip x Winchell. A black grape ripening a week before Concord. Bunches are small, loose. Fruit has a vinous flavour. Indifferent in a recent wine test. Probable discard.

251428, King Philip x Winchell. Small, black berry, medium-sized bunch. This selection has been a heavy bearer but the quality has been only fair. Inclined to overbear. Wine test not favorable. Probable discard.

TABLE 43. SUMMARY OF 1929 TO 1937 BREEDING FOR WINE GRAPES FOR ONTARIO CONDITIONS. PROJECT 2

Family No.	Parentage	No. Seeds	No. Vines	No. Selections
2917	Brocton x Winchell*	600	30	4
2918	Brocton x Self‡	500	40	7
2920	Champanel x Self	2220	90	0
3508	Demand x Ontario		2	1
2925	Dutchess x Eumelan	700	108	0
3701	Golden Muscat x Lomanto		132	5
3702	Golden Muscat x Seneca		452	15
2907	Herbert x Agawam	573	15	4
2905	Herbert x Lomanto	366	17	1
2909	Herbert x Nitodal	300	30	1
2901	Herbert x Patricia	540	5	1
2923	Lomanto x Campbell	1520	37	0
3705	Lomanto x Golden Muscat		289	22
3706	Lomanto x Seneca		222	30
2927	Manito x Self	680	61	4
3509	Pearl of Csaba x Lomanto		8	2
3501	Rose Hamburg x Ontario		10	3
3703	Seneca x Golden Muscat		274	16
3704	Seneca x Lomanto		66	1
3505	Unknown *vinifera* x Ontario		41	7
3512	Unknown *vinifera* x Seneca		125	3
2913	Wilder x Agawam	630	31	0
2914	Wilder x Winchell	420	34	4
		9,049†	2,119	131

* The parentage of this family is questioned since there are a number of black selections.

‡ It is questioned whether Brocton was selfed since there are both red- and black-fruited selections.

† Incomplete. No seed record of several parentages.

Table 43 is a summary of the breeding work under Project 2. The table lists all crosses made from 1929 to 1937. Most of these crosses were for improved wine grapes, but some were for improved dessert quality. There is always some overlapping of projects and it is quite possible for a good dessert grape to come from a cross of two "wine" varieties.

There were 26 selections made from the 498 seedlings of the 1929 breeding and 15 of these are still under observation. Brief descriptive notes of these are as follows:

29012, Lindley x Patricia. A black grape ripening a few days after Concord. Bunches have been small to medium in size, and the crop has been rather light. However, it showed up quite well in a small wine test and is being given further trial.

FIG. 28. A six-acre block of closely-planted grape seedlings, part of the earlier breeding work noted in the accompanying text.

290514, Herbert x Lomanto. A black grape ripening a few days after Fredonia. Bunches and berries are small. Probable discard.

29071, Herbert x Agawam. A red grape ripening in Agawam season. Bunch is only medium in size and somewhat straggly. Quality is fair to poor. Wine test was not favorable. Probable discard.

29074, Herbert x Agawam. A black grape ripening just ahead of Concord. Bunch size has been small. Only fair in quality. Wine test was not favorable. Probable discard.

29076, Herbert x Agawam. A black grape in Concord season. A small, compact bunch. Quality is fair. Wine test was not favorable. Probable discard.

290714, Herbert x Agawam. A black grape ripening a few days ahead of Concord. Bunches are small to medium, and somewhat straggly. Quality is fair. Wine test was not favorable. Probable discard.

29141, Wilder x Winchell. A black grape ripening about one week after Fredonia. Bunch and berry are small. Vines are rather weak. Quality fair to good. One wine test was favorable. Will be given further test.

29142, Wilder x Winchell. Similar to 29141. No wine test as yet.

29143, Wilder x Winchell. A black grape about Concord season, medium-sized bunch. One favorable wine test. Worthy of further test.

291711, Brocton x Winchell. A black grape a few days before Concord. Straggly bunch and small berries. Only fair quality. Probable discard.

291712, Brocton x Winchell. A black grape of Concord season. Bunches are small but compact. Fair to good quality. To be given further test.

291729, Brocton x Winchell. A white grape ripening a few days before Niagara. Bunches and berries are small. Quite sweet but not much real flavour. Wine test not favorable. Probable discard.

29184, Brocton x self. A black grape ripening in Concord season. Medium size, compact bunches. Vinifera type, fair to good quality. Ten vines planted out in 1945 had a fair crop in 1948. Further test justified.

29186, Brocton x self. A late red grape, ripening a week after Concord. One of the most promising selections. The bunches are quite large and of medium compactness. It has cropped well, and when well ripened the quality is good. Wineries have shown a slight interest. It has had a limited distribution to Experiment Stations in the States. For the Niagara District the late season is one of the main drawbacks.

292718, Manito x self. A black grape of Concord season. It has been a regular bearer of medium-size bunches. Vines have been above average in vigour. First wine test was favorable and it will be given further test.

The original seedling vines were grown on light soil. Under these conditions all the above selections were sufficiently promising to warrant further trial. However, when propagated and then grown on a heavy clay (a more normal Niagara grape soil) many of the selections have failed to do as well as on the light soil.

Further reference to Table 43 shows that there have been many (131) selections from the wine-variety breeding work. Some parentages, particularly in the 1937 breeding, have been especially productive of promising seedlings, and since the seedling populations have been grown throughout on fairly typical grape soil, it is hoped that the performance of propagated vines on grape soil will equal the performance of the original seedling vine.

The selections from the 1935 and 1937 breeding are very recent. Since there is, as yet, no record of performance from propagated vines, they are not listed or described in this report. However, there may be some value in the accompanying general observations on the behaviour of various parentages.

3501, Rose Hamburg x Ontario. Ten vines of this cross were planted in the field and from these, three have been selected, one being white and two blue. The white one is Seneca season, and the two blues are Fredonia and Concord season respectively. In all three selections the sugar content is higher than Concord.

3505, Unknown *vinifera* (white) x Ontario. There are seven selections from the 41 plants of this cross. All seedlings from this cross have been hardier than average, very little winter killing taking place. The maturity season of the selections varies from just after Seneca to after Concord, with the later ones predominating. All selections are white in colour. Sugar content averages a little higher than Concord. Wine tests have been favourable on several selections.

3512, Unknown *vinifera* (white) x Seneca. There have been three selections from 125 vines planted. All selections are Concord or later in season, and are white-fruited. One is particularly high in sugar.

3701, Golden Muscat x Lomanto. Five selections out of 132 vines grown. The cross has given all blue grapes of about Concord season. Bunches and berries are medium in size, and the sugar content has averaged higher than Concord.

3702, Golden Muscat x Seneca. Fifteen selections out of 452 vines grown. The fruit of all seedlings in this cross, selections and discards, was green in colour. Season varied from Seneca to after Concord. The yield has been a little light, but the bunches above average in size. Sugar content has been quite high, but quality only fair.

3703, Seneca x Golden Muscat. Sixteen selections out of 274 vines grown. Like the 3702 cross, the fruit of all the seedlings was green in colour. With one exception the season has been Concord or later. The bunches and berries are above average in size. Sugar content of selections has averaged higher than Concord, and quality fair to good.

3705, Lomanto x Golden Muscat. Twenty-two selections out of 289 vines grown. All of these are black in colour. The season varies from after Fredonia to after Concord, with the later ones predominating. The sugar content has ranged from that of Concord to that of Delaware. Except in one or two cases the wine tests have been fair only, but there are several selections with dessert possibilities.

3706, Lomanto x Seneca. Thirty selections, all blue, out of 222 vines grown. There are a few early seedlings but mostly they are Concord season. The sugar content has been higher than average and the bunch size often small. The 1947-48 winter caused more injury than in some of the other crosses.

No breeding work was carried on during the years 1938 to 1946. In 1947 and 1948 a small number of seedlings have been grown from numerous crosses. Some of the more promising crosses of earlier years have been repeated; and some of the newer varieties, the French hybrids, and Station selections, have been used as parents. A summary of this work is given in Table 44.

TABLE 44. SUMMARY OF GRAPE BREEDING 1947 AND 1948

Family No.	Parentage	No. Seeds	No. Vines
4701	Buffalo x Seneca	58	24
4702	Herbert x Brocton	16	9
4703	Herbert x Buffalo	17	4
4704	Herbert x Ontario	42	19
4705	Herbert x Seibel 1000	23	12
4706	Oberlin x Portland	7	5
4714	President x Open	233	31
4801	Rose Hamburg x Seneca	30	
4715	Rose Hamburg x Open	200	29
4707	Seneca x Buffalo	39	18
4708	Seneca x Lomanto	167	76
4709	Seneca x Ontario	33	5
4710	Seneca x Seibel 1000	114	30
4711	Seneca x 29186 (Brocton selfed)	114	38
4712	Violante Special x Seneca	18	0
4802	NY11421 (Chasselas Golden x Brocton) x 37023	7	
4803	37023 x 370210	68	
4804	37023 x 37069	15	
4805	Seibel 1000 x President	31	
4806	Seibel 1000 x NY11421	72	
4807	Seibel 1000 x Seibel 7053	63	
4808	Seibel 1000 x 29186	21	
4809	Seibel 1000 x 370210	131	
4713	29186 x Seneca	22	
4810	35053 x Rose Hamburg	8	
4811	35053 x 35123	5	
4812	35053 x 370210	28	
4813	35053 x 37069	12	
4814	35054 x President	67	
4815	35054 x NY11421	16	
4816	35054 x 35052	48	
4817	35054 x 35053	81	
4818	35054 x 370210	98	
4819	35054 x 37069	57	
4820	35054 x 370621	56	
4821	35123 x 37023	25	
4822	37023 x 35123	23	
4823	370210 x Rose Hamburg	69	
4824	370210 x 35123	39	
4825	37065 x Bronx Seedless	18	
4826	37065 x Rose Hamburg	154	
4827	37065 x Seibel 7053	41	
4828	370621 x Rose Hamburg	23	
4829	37069 x 37023	52	
4830	37069 x 37058	55	
		2,516	300

THE GRAPE SUB-STATION

This 35-acre addition to the Experiment Station was purchased in 1946 from Howard M. Rittenhouse. It is in Clinton township, on Cherry Avenue, about a half-mile north of No. 8 Highway. The distance from the Experiment Station itself is three miles, close enough to permit of easy servicing in various cultural operations throughout the season.

Choice of location, a good two miles back from Lake Ontario, was deliberate. Grapes need heat, and while vineyards on or within a half mile of the lake have a longer frost-free period than vineyards back from the lake, yet the cooling influence of the lake during the summer delays maturity and lowers quality in most seasons.

The soil generally is a stiff clay-loam, a good grape soil, with about five acres of sandy knolls. The whole acreage was underdrained in the spring of 1948, underdrainage probably being more necessary for the French hybrids than for American varieties.

Planting was started in the spring of 1947, with further plantings that fall and again in the spring and fall of 1948. At the close of 1948, planting was approximately two-thirds complete, together with posting and wiring. Some 60 varieties have been planted. Generally there are not less than 100, and up to 200 vines of a variety. This will provide sufficient fruit both for Station research purposes and semi-commercial processing, and for interested processing companies. Also it will assure ample propagating wood of varieties found to be promising.

Varieties now planted and to be planted have in mind the various purposes for which the grape is used—fresh, jam, juice, jelly, wine, brandy. Included are old and new varieties of North American origin such as Buffalo, Concord, Elvira, Lomanto, Niagara, Seneca; many Seibel and other French hybrids; and promising station hybrids.

FIG. 29. The grower of fruits and vegetables is often reminded of the value and necessity of attractive sound packaging for his produce. The bulletin "package" too, can have sales appeal, inviting closer inspection, even study, of the contents.

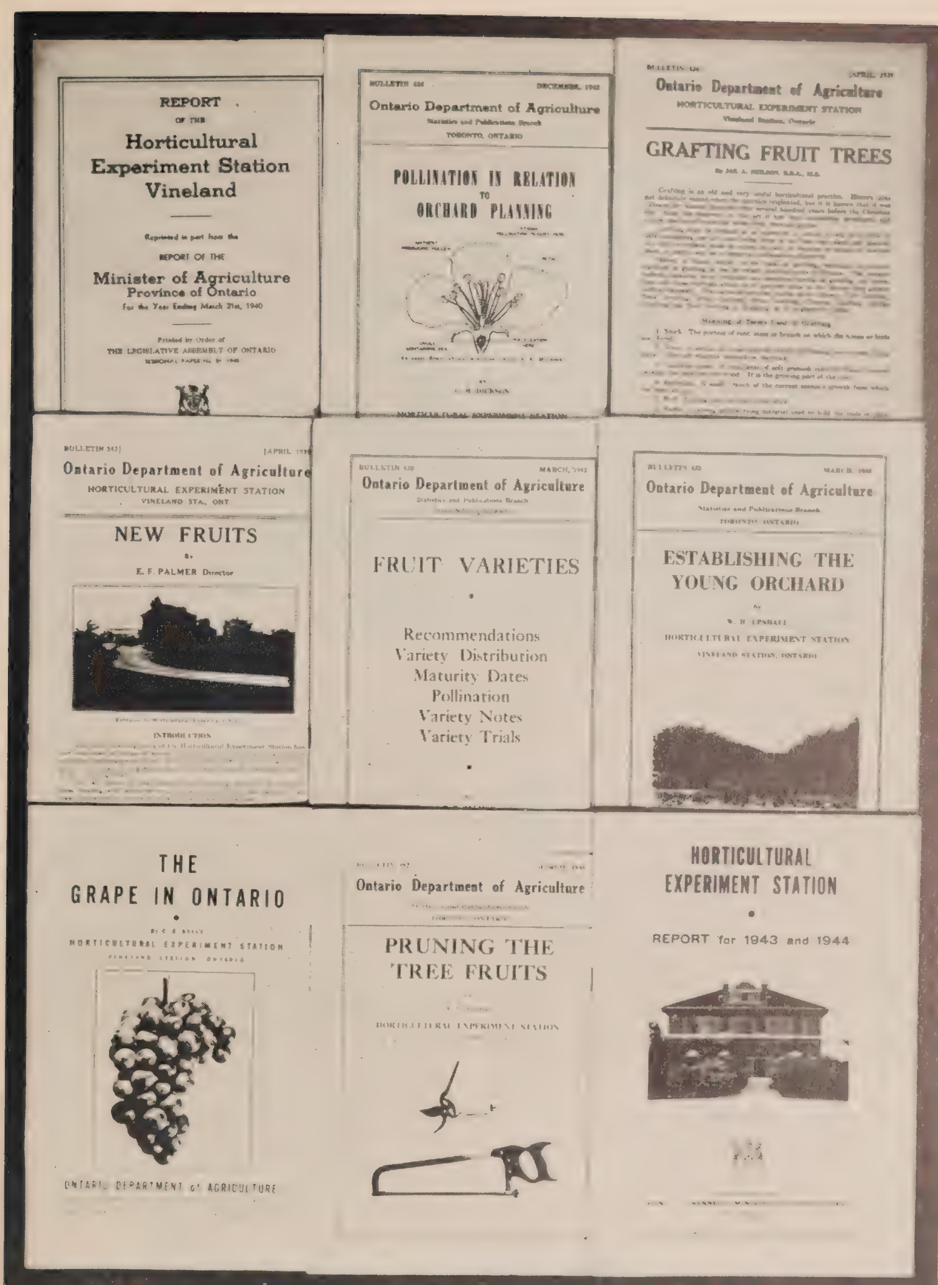

FIG. 30. The above bulletins and publications may be as well written and as well presented as those depicted on the opposite page. The contents may be well graded, even nourishing. But sales appeal is lacking.

EXTENSION

DISTRIBUTION OF PROPAGATING MATERIAL

The distribution of true-to-name propagating material of fruit varieties continues as a substantial service to growers and nurseries. Table 45 indicates the extent of this service during the period covered by this Report, 1947 and 1948.

TABLE 45. DISTRIBUTION OF PROPAGATING MATERIAL, 1947 AND 1948. STANDARD FRUIT VARIETIES

Kind	No. of Varieties	Distribution: Plants Trees	Scions	Buds	No. of Grower and Nursery Contacts
Apple	104	114	25,515	14,115	109
Apricot	9	12	110	685	17
Cherry	28	28	640	13,520	32
Nectarine	2	—	—	30	2
Nut	1	—	—	75 (Nuts)	4
Peach	53	153	30	41,250	76
Pear	55	43	463	13,730	55
Plum	53	3	560	40,850	57
Grape	43	26	11,800	—	25
Currant	27	6	5,245	—	19
Gooseberry	8	2	205	—	8
Raspberry	17	600	—	—	13
Strawberry	17	1,450	—	—	23
	417	2,437	44,568	124,255	440

NURSERY INSPECTION FOR VARIETAL MIXTURES IN THE TREE FRUITS

Since 1925 the Station has been offering to Ontario nurseries a free inspection service designed to eliminate a high proportion of the varietal mixtures in the nursery row. The nurseries have given splendid co-operation and practically all of the saleable fruit trees grown in Ontario each year have been examined. Mixtures were broken down or labelled correctly. Subsequent to this inspection, varietal mixtures may occur at digging or shipping time and only extreme care and good organization on the part of nurseries will ensure that the growers get true-to-name trees.

The summary figures on inspection up to 1942 were given in the 1942 Station Report and are here brought up to date in Table 46.

TABLE 46. VARIETAL MIXTURES ELIMINATED IN TREE FRUITS IN ONTARIO NURSERIES

	Trees examined	Mixtures found	% Mixture
1925 to 1942	13,499,650	121,866	0.9
1943	514,350	2,531	0.5
1944	380,050	4,216	1.1
1945	538,515	5,904	1.1
1946	645,600	9,292	1.4
1947	836,950	24,742	3.0
1948	1,132,000	10,244	0.9
Totals	17,547,115	178,795	1.0

FIG. 31. Spraying demonstration. Progressive fruit growers never look backwards in their search for improved methods of pest control.

NIAGARA PENINSULA SPRAY SERVICE

The Niagara Peninsula Spray Service is a joint effort of the Dominion Laboratory of Plant Pathology at St. Catharines, the Dominion Fruit Insects Laboratory at Vineland Station, and the Horticultural Experiment Station. It was first organized by the Laboratory of Plant Pathology in 1924. The Experiment Station assumed responsibility for the service in 1929.

At the beginning of each spray season the spray calendars published by the Department of Agriculture are sent to growers on the mailing list. The calendars give the recommendations for controlling disease and insect pests attacking fruits and vegetables. In addition, mimeo circulars are issued from time to time, reminding growers of pending spray applications and suggesting modifications of the spray schedules necessitated by unusual conditions of weather or pest outbreak.

The Pathology and Fruit Insects Laboratories supply information on control measures, and the Station is responsible for mailing the spray calendars and circulars each season to fruit and vegetable growers in Haldimand, Welland, Lincoln, and part of Wentworth County.

In order that the recommendations for controlling disease may be as widely circulated as possible in the fruit sections of the Peninsula, copies of spray circulars are supplied to the district newspapers, radio stations, dealers in spray materials, and the Agricultural Representatives for each county.

The number of names on the mailing list has increased greatly in the last few years as shown by the following figures:

Year	No. growers on list	No. of circulars issued
1943	1518	12
1944	1283	12
1945	1580	24
1946	1904	24
1947	1997	16
1948	2907	18

GRAPE SURVEY

TABLE 47. NIAGARA DISTRICT* GRAPE ACREAGE WITH NEW PLANTINGS, 1942 TO 1947

Variety	Full bearing	1942	1943	1944	1945	1946	1947 (proposed)	Totals
	acres	acres	acres	acres	acres	acres	acres	acres
Concord	8,729	61	133	225	216	409	483	10,256
Niagara	1,906	4	66	28	30	70	74	2,178
Fredonia	229	7	29	39	46	165	65	580
Agawam	401	—	7	3	9	20	34	474
Delaware	62	—	—	8	8	42	47	167
Elvira	31	—	—	—	29	51	24	135
Catawba	39	—	4	5	5	21	44	118
Moores	49	—	—	—	—	1	5	55
Ontario	23	—	—	5	2	9	3	42
Worden	32	—	—	3	3	—	—	38
Campbell	21	—	—	2	1	4	3	31
Patricia	28	—	—	—	—	—	—	28
Champion	18	—	—	—	—	—	—	18
Portland	15	—	—	—	2	—	—	17
Rogers	14	—	—	—	—	—	—	14
Lindley	13	—	—	—	—	—	—	13
Misc.†	86	3	—	25	48	49	61	271
	11,696	75	239	343	399	841	843	14,435

* Townships of:—Binbrook, Clinton, Grantham, Louth, Niagara, N. Grimsby, Saltfleet, Stamford, Pelham and Thorold.

A 1947 survey undertaken co-operatively by the United Grape Growers' Assn., the Ontario Wine Producers Assn., and the Ontario Department of Agriculture.

† Includes Brighton, Caco, President, Seibel 1000, Seneca, Vergennes.

VEGETABLE PROCESSING CROPS

The program of extension work with vegetable crops, initiated in 1946, continues to expand. Primarily, the effort is to determine the pressing cultural problems, and meet these problems as effectively as possible. The major crops concerned are tomatoes, sweet corn, snap beans and peas.

Since there are upwards of 25,000 growers of these processing crops, little can be accomplished by direct personal contact with the individual grower. The most effective approach is through growers' local organizations, the existing field services of the processing companies, "schools" for various groups such as plant growers, and cultural bulletins and leaflets.

In 1947, 29 group meetings, average attendance of 72, were addressed. These meetings included the fourth Annual Joint Grower-Processor Convention, four schools for plant growers, seven schools for tomato growers, and some 17 county or regional growers' meetings.

The schools for plant growers were of particular importance. Inferior plants supplied to growers are a major cause of the low average per-acre yield of processing tomatoes. Two important factors, which relate to plant-production methods, involve the soils or composts used, and measures for the prevention or control of diseases. Efforts to improve this situation have included regional schools for plant growers, the issuing of advisory circulars to all known plant growers, and visits to plant-growing establishments.

In 1948, in addition to such activities as the schools for plant growers, canning crops achievement clubs were conducted in three counties. Assistance included the scoring of growing tomato crops in Prince Edward county and peas in York, and field days and picking schools in Haldimand.

Also during 1948, 34 can-crops growers' meetings were attended and addressed, average attendance 85. Four additional meetings, sponsored by processors, were attended; also several meetings of technical workers to discuss disease control and protection schedules.

Fieldmen of the processing companies can do much to disseminate information on new and improved cultural methods. To assist these key men the Department of Agriculture sponsored, at the O. A. C., in early December, a two-day conference. Instruction, by competent authority, was given on soil management and fertilizer practices, cultural requirements of crops, pest control, grower-processor relationships. Some 73 processor representatives were in attendance.

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Ontario Department of Agriculture

96th ANNUAL REPORT

of

Ontario Agricultural Societies 1949

also Report of

ONTARIO ASSOCIATION OF AGRICULTURAL SOCIETIES

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Col. The Hon. Thomas L. Kennedy,
Minister of Agriculture, Ontario.

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1935 to 1949—Ontario Association of Agricultural Societies.

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1948— D. M. Stewart, Osgoode
1949— E. H. Buck, Paris, R.R. 2

*Deceased.

Ben Bleecker, Halloway
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14	Cochrane, Temiskaming
15	Kenora, Rainy River, Thunder Bay

PRESIDENT'S ADDRESS

E. H. Buck, Paris, R.R. 2

IT gives me much pleasure and a feeling of great honour, also much responsibility as your president, to have the privilege of welcoming you to the 50th annual convention of this large organization.

The year 1949 will long be remembered as most unusual and difficult for Ontario farmers. The rather cool and not too early Spring, followed by a serious lack of moisture in many sections of the Province, resulted in a greatly decreased yield of below average in quality coarse grain crops. Consequently, many of the fields entered in crop competitions were not up to the usual standard. Still, in spite of adverse weather conditions existing in some areas, 200 field crop competitions were satisfactorily completed this past year.

However, rain finally came along in time to help develop late crops such as corn, roots, vegetables, etc., with the result that, generally speaking, the number of exhibits at Fairs was greater, and the quality good. With this change in weather, rain even interfered with the attendance at some of the Fairs in the northern section and several District No. 8 Fairs reported very rainy days.

In going over District Directors' reports, I find that at many Fairs there was a noticeable improvement in the condition of grounds and buildings, making the Fairs more attractive to the public.

Many Fairs are placing stress on home crafts. Classes of handicrafts and hobbies are becoming stronger every year, and showing remarkable talent amongst the exhibitors. Demonstrations, with the operators actually doing the work at some Fairs, proved very interesting.

Problems of Societies include difficulty in some districts in getting the farmers interested in showing their livestock. Particularly is this true of dairy cattle, as many of the farmers do not wish to disturb their cows by taking them out to the Fairs. Another problem is how to raise enough money to meet increasing costs. Lack of sufficient time to run off a full day's program still continues to be a difficulty experienced by some of the so-termed one-day Fairs.

With more machinery available and in keeping with the general trend towards greater mechanization of farms, displays of farm equipment at Fall Fairs are each year becoming larger and more extensive. Not only do these displays add interest to a Fair but they are very popular, particularly with a good many farm young people, who, in increasing numbers, are having less to do with horses each year, and are very much tractor minded. Some Fairs staged machinery parades immediately following that of the prize-winning live stock, and with a good commentator explaining the use, etc., of the various machines, this event can be made very interesting for the urban people attending. There was also a notable increase in the number of other commercial exhibits, and many fine educational displays were put on by various organizations, and the Department of Agriculture.

Juniors have ability, initiative, aggressiveness and vision, and in my opinion agricultural societies cannot afford to be without their co-operation, support and

services. Consequently, I feel that among the most important projects carried on by agricultural societies is that of boys' and girls' club work. Once they become interested in better livestock and improved crops brought about through participation in club projects they can play a larger part in our exhibitions. If our Fairs are to continue to fill the place they are expected to in the community, the juniors must be encouraged by giving them the opportunity to become part of our Fairs by exhibiting and competing in the various club activities. A few dollars and a little time and effort spent on juniors today will pay big dividends to your Agricultural Societies in future. To me, it has been quite striking over the years to note the number of former club members who are now leading exhibitors in the open classes, and the number of former Junior Institute and Junior Farmer members who are rendering real service as Agricultural Society directors, secretaries and presidents.

Agricultural Societies in turn have a responsibility to youth. We must see that our farm boys and girls are given direction and leadership in the things which go to make up wholesome living. Through our various projects and our Fall Fairs we can do much to instil into the minds of our rural youth the proper attitude to farm life. We can do a great deal to create a fondness, too often lacking, for agriculture and its great possibilities.

Conservation of soil, trees, water and wild life is very important and might logically be considered the direct responsibility of Agricultural Societies. But the conservation of human resources should receive first consideration, particularly in view of the fact that agriculture is the most important single industry in Canada —about one-quarter of the population is engaged in farming, and since the task of "feeding the world" is termed "one of the finest", surely we are not going to shirk this great responsibility.

Naturally I have been very pleased indeed to have several of the District Directors report that each year more Fairs are introducing departments to train our boys and girls to become better farmers and exhibitors.

Of paticular interest to me was the following paragraph from the report of a District Director: "The trend of Fairs in District . . . in 1949 was for the larger Fairs to get a little larger, and the smaller ones to just hold their own." This to my mind presents a true picture of conditions with respect to Fairs in most districts of the Province. The success or failure of a Fair or an Agricultural Society cannot be judged by the surplus or deficit which may be shown from the balance sheet. Many Fairs or Societies may show a very healthy cash balance at the close of the year and still will have failed entirely in their real work, which their officers should have had in mind. Many others may be very successful from an educational point, and at the same time present a balance sheet with only a small surplus, and in many cases a deficit. The real test of success lies in the manner which can conscientiously be made to the question, "Does your Society or Fair make a worthwhile contribution to the advancement of the agricultural industry?" The larger Fairs with very attractive grounds and buildings and big midways are grand events and draw tremendous crowds, but I am of the opinion that many of the smaller Fairs make a greater contribution to agriculture. They often conduct

larger and better crop competitions and other projects, thus spreading their influence over a wide area. Generally speaking, a big percentage of exhibitors at these Fairs are residents of the immediate district, many of whom never exhibit at any other Fair. While making a lot of money is not their real purpose, still the smaller Fairs have to operate with considerable profit if they are going to render efficient service and be able to make repairs and improvements to their property and equipment, and what is very important, advance. They must not stand still. This is where a great many of them are experiencing difficulty. How can we expect anything else with the strong competition of neighbouring "B" Class Fairs, who each year receive from the Federal Government substantial grants towards judges, junior classes and capital expenditure.

Therefore, I maintain that our Ontario Government, by means of grants along this same line, even if on a much smaller scale, could do much to assist our smaller Fairs to the place where they would be a far greater asset to this good old Province. Consequently, I believe it is high time that some action was taken to bring this to the attention of our provincial members and the Minister of Agriculture.

During the past year the officers of your Association gave considerable thought to soil improvement and conservation generally. To work out a program of soil improvement and with particular reference to grants being made available to counties, a committee was constituted last winter to draft a policy and consider procedure. At the first meeting, held on February 28th, your Association was represented by Mr. F. A. Lashley and your President. The latter part of June a small group of your executive and prominent Society workers on behalf of the Association presented a brief, explaining the services rendered in the past, and suggested recommendations and ways in which assistance could be given by Agricultural Societies towards soil improvement to a select committee of the Ontario Legislature appointed to study conservation in all its phases. Our aim, as custodians of the soil, should be to leave this great heritage of Ontario farm land to our sons and daughters in a condition, as good or better than when we received it, and if we are going to do this, considerable work must be done on soil improvement. We believe that here in many ways Agricultural Societies can play an important part.

Special commercial feature exhibits, if they are carefully planned and arranged, are a splendid medium through which to teach the farmers of your district more efficient and economical methods of producing the highest grade of various agricultural products. In addition to this, could they not be so arranged as to educate our urban people, who attend our Fairs in large numbers, and who are potential customers, on the merits and advantages of using more of these quality food products? It is rather disappointing to learn that this past year only 48 Societies took advantage of the extra grants available for this type of exhibit. Since Great Britain will be buying this year only limited quantities of many of our agricultural products, would not 1950 be an opportune time to stimulate, by means of these feature exhibits, increased consumption of, and thus create a market for more of our farm commodities right here at home.

With prices for farm produce more uncertain than they have been for several years, now, more than ever before, economy of production will be a deciding factor in whether or not farm operations are to be financially successful. If a larger percentage of farmers would use registered seed, higher yields and better quality crops could be produced. College experiments show that large plump seed will produce a yield of from 5 to 15 bushels more per acre than poorly graded seed. Is there anything more valuable that a Society could do than to increase yields when it can be done without increasing the labor costs? Would this not in turn bring about a decrease in the cost of producing livestock products that depend on field crops for their development? Let us then, as Agricultural Society workers, strive to render greater service to the people of our districts by conducting more and better field crop competitions in 1950.

The organization you represent here today is one of the longest established and is, or should be, one of the most important and influential Associations in the interests of agriculture. Since ours is the fundamental of all industries, you, who are gathered here today from all parts of the Province should be proud to take an active part in Agricultural Society work. There is no organization in this Province that has a better chance to encourage and display the best in agriculture.

Let us then strive to keep our exhibits and competitions up to the highest standards. An effort has been made to give you a programme of interest, education and inspiration, but the real success of our convention depends on you. I urge you to be present at every session, be prepared to take part in the discussion periods, gather all the information you can, and return to the Society you represent better prepared to give leadership.

We are now embarking on the second half of the 20th century. Great progress has been made by Agricultural Societies in the past fifty years, but we must not be content to stand still and rest on our laurels. We must be constantly on the lookout for new ideas and projects. Let us all pull together and strive for even greater achievements.

I wish to take this opportunity to extend thanks and appreciation to our Superintendent and Secretary, Mr. J. A. Carroll; his associate, Mr. F. A. Lashley, and the staff, for the very efficient manner in which their work with Agricultural Societies has been conducted.

Appreciation is also tendered to our Executive and Directors, and our Agricultural Representatives, for their splendid co-operation and assistance. In short, our thanks are extended to each and every one who has assisted us in any way in our work throughout the past year.

To you all, I express my deep appreciation for the honour you have conferred on me in entrusting to me the duty and privilege of being your President. May 1950 bring to Societies continued success and prosperity.

REPORT OF SUPERINTENDENT

J. A. CARROLL, Toronto

FAIRS

CONDITIONS generally were favourable for Fairs in 1949. While there was more rain during the Fall Fair season, and 50% more Fairs applied for wet weather grants, at a total of 35, farm work was well advanced, and in spite of the severe drought of some areas, conditions generally were good.

Whether the favourable conditions referred to above deserve the credit, or whether our Fairs are improving, our people were "fair-minded". New attendance records were chalked up, and 61% of Fairs had increased attendance. Notable increases were reported by the following. In several of these cases there were special features which greatly increased attendance:

Russell	439%	Streetsville	147%	New Hamburg	93%
Richmond	435%	Ingersoll	104%	New Liskeard	74%
Clinton	224%	Sutton	95%	Blackstock	67%

Societies standing highest in gate receipts:

More than 2 pay days		*2 pay days*		*1 pay day*	
Can. Lakehead	$23,172.00	Richmond	$8,000.00	Woodbridge	$5,836.00
Peterborough	17,812.22	Owen Sound	5,468.00	Teeswater	5,680.55
Norfolk County	13,580.00	Caledonian	5,461.00	Erin	4,929.80
Leamington	10,536.90	Markham	3,980.00	Rockton	4,559.20
Welland	9,550.25	Collingwood	3,555.00	Metcalfe	4,355.15

Admission Charges (217 Reporting)

No. Societies Charging:	*25c*	*35c*	*40c*	*50c*	*Other Amounts*
	37	111	9	57	3

The increase in number of exhibitors is most encouraging, as it was more marked than attendance. Over 74% of Societies reported more exhibitors than in the previous year. Merrickville held a Fair in 1949, but not in 1948.

JUNIORS

Each year juniors become more prominent in the program of Societies, both in the opportunities afforded to exhibit, and also in the responsibilities being placed upon them to make the Fair a success. In 1949, nearly 70% of all Junior Clubs organized in the Province were sponsored by Agricultural Societies, and having exhibits at their Fairs. With 260 clubs sponsored, a credible increase was shown, as the figure last year was 228. Two new kinds of clubs were promoted this year —the Tractor Maintenance and Forestry—included for the first time in the club policy. Calf Clubs continue to lead, as 159 of these were featured. The total membership in clubs sponsored by Societies was over 4,000 boys and girls. 65 Societies co-operated in Girls' Home Garden Clubs, which include exhibits by over 500 girls, and covered fresh and canned vegetables and flowers. Some 420

girls participated in the Home-Making Club programmes of "A" and "B" Class Fairs. At several Fairs, such as Brampton and Markham, a junior department was built up in co-operation with the Junior Farmer organizations.

The co-operation of the Women's Institute Branch and District Home Economists is appreciated.

BREED SHOWS

Shows organized by breed organizations, and receiving grants from the Ontario Livestock Branch, were again sponsored by, and became the main feature of many Society Fairs.

Breed	**County or Regional**	**Largest Number of Animals**		**Championship Shows**		
		Fair	*No. Animals*	*No.*	*Fair*	*Largest No.*
Cattle—						
Black and White	38	Woodstock	212	4	London	241
Red and White	17	S. Counties	105	2	Ottawa	120
Jersey	19	Ottawa Valley	170	2	Ottawa	166
Shorthorn	7	Owen Sound	108			
Guernsey	9	Markham	126	1	Simcoe	150
Hereford	3	Teeswater	107			
Swine—						
Yorkshire	6	Collingwood	107	3	Erin (York)	133
Sheep	5	Markham	231		Markham (Tam.)	73
					Leamington (Berk.)	72

BACON HOG SPECIALS

The T. Eaton Co. Ltd. gave a grant to each of 54 Societies. Similar specials were offered by packing and other firms. Two of the larger exhibits were: Teeswater, 34 hogs; St. Mary's, 30.

Grants

Regular Grants	
242	Societies
9	Stock Grants
7	Membership
4	Indian
Total 262	

Special Grants	
Northern Ontario	42
Field crop competitions	203
Commercial production features	50
Wet weather	35
Centenary	1
Number Societies getting lower grants due to horse races	24

The total expenditure of all Societies was increased appreciably over the previous year, and had it not been for an increase in the appropriation of $15,000, there would have again been a reduction in the percentage on expenditures paid

to Societies. Payment was at the rate of 20.3% as compared with 18.6% in 1948. This provided larger grants for the majority of Societies, and those that had increased their expenditure above the average of course benefited both ways.

RACES

Perhaps an explanation would be appreciated by some re the item above on the reduction of grants due to races. A regulation issued by authority of the Agricultural Societies Act is here abbreviated: "Every Society that paid in prize moneys for horse races, running races and trials of speed an amount, less the entry fees for the same, greater than 25% of the total amount of moneys paid in prize moneys for agricultural purposes, may have the amount of grant it would otherwise be entitled to receive reduced by 20%.

It is gratifying that the number of Societies affected was decreased to 24 compared with 36 the previous year.

We congratulate the boards and racing fraternity on the improvements made in recent years by the use of starting gates and better planned programs. We urge that boards and racing people continue to give consideration to safety, to which reference will be made by another on this program.

COMMERCIAL FEATURE GRANTS

So that boards may know where to turn for advice in considering a commercial feature project of a specific kind, a number of products and Societies sponsoring them are included:

Feeder Cattle—Providence Bay, Teeswater, Paisley, Carp, Feversham, Manitowaning, Melbourne.

Grain—Burford, Port Elgin, New Liskeard.

Baby Beef—Thessalon, Ridgetown.

Poultry and Eggs—Erin, Ancaster, Markham, Caledonia, Seaforth, Binbrook, Meaford.

Cheese—Mitchell, Perth, Delta, Napanee, Warkworth, Listowel, Avonmore.

Bacon Hogs—Ilderton, Campbellford, Walkerton, Paris, Drumbo.

Market Lambs—Dundalk.

Turnips—Mildmay.

Farm Products (Jr.)—Strathroy.

Horses—Renfrew.

Potatoes—Englehart, Erin, Riceville, Barrie.

Milk and Dairy Products—Galt.

Tobacco—Burford.

Vegetables—Royal Winter Fair, Paisley, Exeter.

Fruit—Waterdown, Meaford, Beamsville, Welland.

Honey—Almonte, C.N.E.

CENTENARY GRANT

A centenary grant of $1,000 was paid to only one Society in the year, Millbrook, the board of which is congratulated on the attractive pylon erected. The following have passed the century mark, but have not claimed grants: Wellington County (Fergus), Merrickville, Puslinch, South Lanark (Perth), Plympton and Wyoming, Woodbridge, Belleville, Mariposa (Oakwood), South Perth (St. Mary's), Woodstock, Orillia. The conditions on which grants are paid may be obtained by any interested by writing the Superintendent.

"A" AND "B" CLASS FAIRS

This classification applies only to Fairs which have been recognized by grants from the Dominion Government. We congratulate Erin and Aylmer on qualifying for "B" Class this year. This brings the totals to: "A" Class, 7; "B" Class, 19; Winter Fairs, 3.

IMPROVEMENTS TO GROUNDS AND BUILDINGS

The very commendable movement reported in such a substantial way last year was continued, with the result that in no year was more done to improve Society properties than in 1949, when 120 Societies took action. As a reference to those planning improvements, we include a list under various headings:

New Secretaries' Office—Ripley, Feversham, Wyoming, Welland, Harriston.

New Show Ring—Norfolk (Simcoe), Metcalfe, Williamstown.

New Ticket Office—Ripley, Centreville, Dorchester, Riceville, Comber.

New Judges' Stand—Blackstock, Williamstown.

Hydro Extension—Teeswater, Blackstock, Comber, Parham, Durham, Hanover, Caledonia, Barrie, Schomberg, Belleville, Blyth, Mooretown, Beaverton, Port Perry, Norwich, Listowel, Beeton.

New Fences—Blackstock, Port Hope, Meaford, Milton, Lansdowne, Beamsville, Thorndale, Lakefield, Russell, Welland, Belmont, Williamstown, Caledonia, Blyth, Lombardy, Smithville, St. Mary's, Cobden, Galt.

Toilets—Wallacetown, West Elgin (Dutton), Harrow, Feversham, Owen Sound, Napanee, Oshawa.

New Stabling and Barns—Metcalfe, Merrickville, Exeter, Clinton, Sunderland, Campbellford, Woodstock, Brampton, Arnprior, Beachburg, Sutton.

New Gates—Thedford, Thorndale, Drumbo, Erin, Centreville, Roseneath, Cobden.

Improvements, Race Track—Rockton, Burks Falls.

Purchased Extra Lands—Paris, Ripley, Melbourne, Russell, Cornwall, Ancaster.

Water—Leamington, Rocklyn, Clinton, Vankleek Hill.

New Grandstand—Paris, Ohsweken, Orangeville, Vankleek Hill, Roseneath, Dresden.

Painting Buildings—Durham Central, Caledonia, Blyth, McDonald's Corners, Stratford, Beamsville, Norwood, Sutton.

Lunch Stand or Booth—Lions Head, Wiarton, Dundalk, Strathroy, Campbellford, Harrison.

Dining Hall—Ohsweken.

Kitchen—Woodstock.

Tile Drainage—Zurich, Palmerston.

Levelling and Grading Grounds—Mildmay, Williamstown, Clarksburg, Feversham, Tillsonburg, Stratford, Richmond Hill, Casselman, Milton, Perth, Ayton, Maberly, Welland, Clifford, Mount Forest, Alvinston.

New Equipment—Tara, Meaford, Beaverton, Ripley, Caledonia, Rockton.

Painting Buildings—St. Mary's, Holstein, Markham.

Sheep and Swine Pens — Neustadt, Alvinston, Thamesville, Sunderland, Drumbo, Mitchell, Russell, Clifford.

Repairs and Extensions to Buildings — Tillsonburg, Mitchell, Stratford, Apsley, Norwood, Cobden, Riceville, Arnprior, Wyoming, Delta, Lansdowne, Smithville, Welland, Schomberg, Mt. Brydges, Sutton, Metcalfe, Grand Valley, Comber, Dresden, Clarksburg, Thedford, Durham, Holstein, Caledonia, Lindsay, Acton, Glencoe, Erin, Wiarton, Burford, Blyth, Brussels, Seaforth, Leamington, Williamstown, Peterborough, Forest, Almonte, Beachburg, Owen Sound, Bobcaygeon, Belleville, Strathroy, Madoc.

New Band Stand Pens—Beamsville.

Junior Farmer Building---Brampton.

New Seating or Bleachers -- Lions Head, Owen Sound, Kirkton, Ripley, Drumbo, Barrie, Palmerston.

Two-way Tunnel—Lindsay.

Trees, Bushes, Stones Removed—Middleville, Beamsville, Bobcaygeon.

Arena (Community Centre)—Rocklyn, Parkhill, New Hamburg, Mount Forest, Hensall, Brighton, Clifford.

Livestock Loading Chute—Markham.

Exhibitors' Buildings—Peterborough.

Planting of Trees—Williamstown, Casselman, Barrie.

COMMUNITY CENTRES ACT—1949

The following Societies are co-operating in community plans which make community centre properties available for the holdings of Fairs:

Grounds and Buildings — North Norwich, Carrick (Mildmay), Teeswater, Marmora, Dungannon, Beeton, Kincardine, Seaforth, Englehart, Brighton, Bosanquet (Thedford), Manitowaning, Clifford, Mount Forest, Armour, Ryerson and Burks Falls, Val Gagne, Brock (Sunderland), Huron Central (Clinton), Aldboro (Rodney), Rocklyn, Exeter, Yarmouth and Belmont (Belmont), Providence Bay, Wilmot (New Hamburg), Park Hill, South Huron (Hensall), Machar (South River), Waterdown, Streetsville.

Community Centre Buildings Made Available—Dufferin Central (Shelburne), Peel (Brampton).

Other Projects

CROP COMPETITIONS

Although the serious drought interfered in some areas, the total number of competitions was again increased, as indicated:

Crop	*No. Competitions*	*Competitors*	*High Entry*	
Oats	117	1,553	Thorndale	30
Barley	18	203	Stratford	17
Wheat	12	158	Comber	26
Potatoes	29	362	Tiny and Tay	29
Corn	19	241	Thorndale	22
Soil Building	3	29		
Peas	2	20		
Pasture	1	10		
Beans	1	11		
Hoe Crop	1	23		
Total	203	2,610		

It has been estimated that this promoted the seeding under favourable conditions, of 21,000 bushels of registered seed and 18,000 bushels of certified potatoes. Under the able leadership of their Agricultural Representative, J. E. Whitelock, the three Societies in Halton sponsored an entirely new project, known as a Soil Building competition. They are to be congratulated on their efforts to encourage and assist with the soil program in that county.

CANADIAN NATIONAL EXHIBITION—Agricultural Society Class.

Fifteen Societies entered in this class, and thus made a substantial contribution to the grain display.

PLACING OF SOCIETIES

Seed—Division 1, Matheson; Division 2, Carp; Division 3, Mitchell.

Sheaf—Division 1, Magnetawan; Division 2, no entries; Division 3, Carrick.

Championship Sheaf Classes—Carrick Agricultural Society.

OTTAWA WINTER FAIR

Agricultural Society Class—1, Renfrew; 2, Carleton; 3, Drummond Township; 4, North Lanark.

Association Activities

Enthusiastic district meetings were held in all of the O.A.A.S. districts. Banquets or luncheons were held successfully by several. In District 10 it is customary for the Society to entertain at the point where the meeting is held, and provide some music and light refreshments at the close of the afternoon session. One of the more interesting and perhaps most useful district meetings was held at Kenora, where a dinner was held following the meeting and attended by municipal representatives as well as delegates.

Service diplomas were supplied to 57 Societies, and 78 field crop signs were sold.

J. LOCKIE WILSON MEMORIAL

The second award was presented by the Secretary at a College function on March 26, 1949, to: J. M. Saville, K. L. McGregor (fourth year O.V.C.), H. A. Carruthers, A. G. McKay.

Your Provincial Board took advantage of the opportunity to present a brief to the House Committee of the Legislature on Conservation. The summary is included: "We recommend the promotion of a definite program of "land improvement", a major part of which should be every encouragement possible to "animal agriculture", or livestock farming. To improve land, and thus conserve it, demands the best of husbandry, and this Agricultural Societies have promoted through a long past and propose to encourage in the future.

"We urge that special attention be given to the organic content of soils and to the water conservation possibilities of thicker stands of grasses and clovers. We recommend that more attention be given to the protection and development of wood-lots.

Finally, gentlemen, you are assured of the active suport of Agricultural Societies in any sound conservation policies which may be adopted for this Province."

CANADIAN ASSOCIATION OF FAIRS AND EXHIBITIONS

The O.A.A.S. was admitted to membership in this organization, and you were represented at the annual meeting.

A matter to which we have given considerable thought has finally been finalized, and the Canadian body now recommends the use of the following colours in prize awards:

Colour—Red for First Prize, Blue for Second Prize, White for Third Prize, Yellow for Fourth Prize, Green for Fifth Prize, Pink for Sixth Prize, Royal Purple for Seventh Prize, Mauve for Eighth Prize, Tricolour for Ninth Prize, Tricolour for Tenth Prize.

INTERNATIONAL ASSOCIATION OF FAIRS AND EXHIBITIONS

It was a privilege to represent the Association at the International meeting in Chicago in December. An important step was taken in forming a separate section for State and Provincial Associations. A few highlights from discussions:

Exhibition and Fair officials enthusiastic.

More attention being given to attractive arrangements.

Great emphasis on Junior Departments with special buildings in many cases.

Much more catering to children.

Midways more strictly supervised in many states.

Horse racing debatable—interest varies with area.

Some States have rather detailed standards for Fairs.

Many counties own Fair grounds.

In some States, if a Society is properly organized, it is entitled to a county grant—in Ohio up to $800.

On your behalf we express appreciation to the press and radio people who help so much year in and out, also to all other co-operators.

It has been a pleasure to work with the President and the 1949 Board. We express thanks to Society officers, particularly secretaries, for their co-operation.

Ingersoll Fair.

We owe much to a loyal staff, including Mr. F. A. Lashley, Associate Director, who carried much of the load during the past year.

This is a Golden Jubilee Anniversary of this Association—the 50th annual convention—but many Societies have stood the test of time for over 100 years. As we start through the second half of the century, it is realized that we are entering a different world, a new era, for it is Atom Year 5. New and perplexing problems confront us, but great opportunities are presented. We have no doubt the Agricultural Societies will meet the challenge. We wish you success in 1950 and the years which lie ahead.

SAFETY AT FAIRS

H. Corbett, Dundalk, Ont.

THE increased attendance at our Fall Fairs, together with the ever increasing number of exhibitors who display their wares at these gatherings brings to mind the question or problem of safety at Fairs.

One of the first cited might be the "parking of cars and trucks". This is a very important item, and is a service very much appreciated by visitors and guests. This service not only gives us something of a feeling of welcome, but it also relieves us to some extent as to where we should direct our course of travel in order to get a safe parking place. The situation can easily be taken care of by having one of the members of your board in charge, and with him a few of the younger men of the district, who perhaps may be members of junior organizations, and who will be very alert to what should be done.

In order to get the best results, the committee in charge of this work should first stake out or make a draft of the area set aside for parking; then do the parking in a systematic manner, and try and arrange it so that there is provision for trucks to be separated from the passenger cars; also keep in mind when planning this arrangement that any driver wanting to remove his vehicle could do so with a minimum of difficulty. You will find in having such a system that you have taken your first step in removing much of the chance of having your car damaged, and you are also making it much more pleasant for your guests and less dangerous for the children.

There is another feature which brings with it a real hazard, namely, the "display and demonstration of tractors and machinery". This may apply more particularly to children, as too often a child may be driving one or more of these tractors, and this naturally draws the attention of other children that may be standing about watching—but not knowing where the machine may move next. We have observed in such instances it was more by good luck than good management that accidents were avoided.

While it may not meet with the approval of the firms putting on the display, I feel that the Grounds Committee is within its righs in making an allotment of space for such displays. It could be in a special corner of the grounds, and away from the congested areas, and the space roped off in order to give at least a

reasonable amount of protection. Supervision might be more effective if left to the observant eye of a couple of senior farm girls, as they are less likely to get entangled in a discussion as to the make or operation of the machines, and more apt to observe the dangers to the children and spectators.

Exhibiting of livestock is also one of the features that may carry with it a measure of possible accidents. It is well to have an enclosure where the animals can be taken during the course of judging. This enclosure can easily be made by using a roll or so of "snow fence", supported by a few posts set in the ground, and if this cannot be arranged, the use of a couple of strands of rope may be passed around the posts. By doing this you not only make it much more comfortable for the judge to perform his duty, but you also keep the spectators back a safe distance. No matter how quiet your animal may be, there is always the possibility of a nervous beast becoming unruly through some unusual noise, sight or action. I have witnessed at least one Fair where there was near panic amongst the crowd. There wasn't a fence or even a rope to protect the public. I might add here that this Fair Board now carries liability insurance.

Horse racing offers one of the greatest accident hazards that we have to contend with at our Fairs, and particularly the green or amateur racers. They insist on driving around and around the track in order to warm their animal before the race starts. This is a real danger and the practice still continues, with many of us having had our "heart move into our throat" on different occasions, where near calamity took place, and where many an accident has happened. It is our duty as members of the Fall Fair Board to do our part in helping to remove some of these hazards.

1st. If we are going to stage horse racing at our Fairs, then let us see that the horses during this warming up period not go all the way around the track, and if such is necessary have them come to a walk when passing that portion of the track where the crowd is gathered and where the spectators are passing to the inside portion of the racing oval.

2nd. Let us be *conscious;* let us be *assuming;* let us feel that we are going to put on the best Fair that our Agricultural Society has ever staged. And there is no better time for us to decide on this than right now. When we go home let us organize as we never organized before, and one of our first resolutions should be safety. At the head of this committee we should have one of our Board members, and with the help of some members of junior farm organizations we will guard the race track as it never was before. We will see there are no spectators inside the guard rail and no crossing the track when the race is on.

This is not a tough job if we are conscious of our responsibility and also liability. Let us first think of the change in times, the ever increasing number of cars that come onto the grounds. We have more entries in most every class and the grounds are packed with people. The responsibility is ours, let us be honest about it.

LIABILITY INSURANCE

ALEX B. MCKAGUE, Teeswater

THE topic assigned to me is, I feel, quite an important one at an Agricultural Society's convention. It is a type of insurance that is becoming increasingly important for individuals, for business concerns and for Societies such as yours, which are sponsoring Fairs or other similar events to which the public pay admissions and as a consequence assumes a responsibility for people's safety while they are on the Society's property. Needless to say, nearly every Society carries fire insurance. If a building burns, it is not necessary to replace it at once, and you know immediately your approximate loss. However, a liability claim may arise which must be paid at once, and which may amount to a much higher figure than the loss of a building.

The purpose of liability insurance is to protect the policyholder from the financial loss which it would otherwise suffer by reason of its having become liable to pay damages to another for bodily injury or for damage to property. It will be appreciated that a detailed statement of the law governing such matters has been the subject of many volumes and that only the broad principles can be given within the limited time that I have at my disposal.

Most liability claims arise through breach of a general duty to take care. The law imposes upon everybody a responsibility so to conduct his affairs that he will not, through his "negligence" or through the negligence of his employees or agents, cause injury to persons or the property of others. The same responsibility, of course, rests on an organization such as an Agricultural Society.

Now that we have decided that the cause for liability claims is negligence, let us consider for a moment what constitutes negligence. The word in itself is a complex legal concept, but for our purposes it may be defined as "the doing of something that a reasonable prudent society would not have done in the same circumstances, or the ommission to do something that a reasonable prudent society should have done." Another important principle of the law is that "He who does a thing by another does it by himself". Applying this to an Agricultural Society, it naturally follows that the Society is responsible for the acts of its employees, such as gatemen, constables, judges, race-starters, etc.

If we except such odd people as the hermit in his cave, far removed from all contact with his fellow man, there is nobody who is not in some danger of causing through an unintentional act of carelessness, a bodily injury to another, or damage to property other than his own, and this is certainly applicable to an Agricultural Society. If the person who has suffered the injury makes a claim for damages, it will be of no avail to the Society which caused it to say that it intended no harm, or that it did not expect any injury to arise from what it did or failed to do, or that it cannot afford to pay; the courts will award damages against it, and it will have to pay, in addition, the "costs" of the claimant's lawyers as well as its own.

Damages are awarded in proportion to the injury suffered, and there is no limit to the amount of a judgment. If a man is killed due to negligence, those who

have suffered a financial loss by the fact that he is no longer living and contributing to their support will be awarded damages commensurate with the value of the support which they could have expected if he had lived. Such claims of course are limited to the immediate relatives. His estate will also have a claim for the funeral expenses and for the expenses of doctors and hospital.

If the injury is not fatal, the damages will include all out-of-pocket expenses such as those for doctors, hospital, nurses and so on, loss of earnings while disabled, and also a sum as compensation for the pain, suffering and general inconvenience undergone. Where the injury is serious, the last item may be a very substantial sum. If the injury should result in permanent impairment, such as the loss of an eye or limb, and particularly if the impairment limits the ability of the injured man to earn his living, a further substantial amount will be awarded as damages. Damages to property are not so likely to run into such high figures, but if a valuable race horse was killed, or a high-priced bull died as the result of eating something which should not have been in its manger, it can readily be seen that such claims could also run into very high figures.

The answer, of course, is liability insurance, and the companies now offer policies to cover these hazards at very reasonable rates. There is no standardization of the policy forms in use, nor has the Legislature imposed for this class of insurance any statutory conditions. It is impossible, therefore, to describe exactly a coverage which will be offered by all companies writing the business. Moreover, as this rapidly growing field of insurance develops, frequent changes are being made by the companies in their policy contracts and in the endorsements available to meet special risks. Most policies are flexible in form and can be so written as to include any insurable hazard which a Society desires to be insured. By all means make certain that your policy covers all your activities for the entire period of your Fair, and if you own your own grounds and buildings, the policy should be written for twelve months.

CO-OPERATING WITH JUNIORS

Ross Beattie, Stayner.

In discussing the subject of Agricultural Societies co-operating with juniors it is unnecessary to take time to sell the idea of the importance of working rural young people into the programmes of an Agricultural Society. I realize this has been done in preceding years and that most Agricultural Societies do give juniors a place in their programme. It might be well, however, as delegates at this convention to refresh ourselves regarding some of the methods we might use to stimulate more effective junior co-operation within our individual Societies.

We might ask ourselves:

1. *Does your Agricultural Society realize the importance of a strong junior programme?* We must keep in mind that youth in any organization, if given its rightful place, provides vigour, pep, enthusiasm and energy so essential for its welfare and success. In most cases a successful exhibitor or showman starts and

gets his training when he is young. We see very few men begin exhibiting at Fairs at middle age. As the present day exhibitors reach retirement we must keep developing young people to take their place. This can only be done by an Agricultural Society giving the necessary direction and leadership, which they can provide through co-operating with juniors.

2. *Are juniors given an active place on the directorate and executives of your Society?* This is very important in order to have the interest of the junior exhibitors as well as having young people trained to carry on as older directors retire; add a junior director or two each year. If necessary limit the tenure of the office of president to two or three years, in order that the younger directors may have an opportunity to move up. Have a live Junior Fair Committee, and make certain you select those with club experience and who are active in junior farmer work. There should be one senior director on the committee. He should be especially interested in junior projects. This arrangement will create harmony and will provide the necessary link between seniors and juniors.

3. *Did your Society sponsor a junior delegate to this annual convention?* Giving a junior director the privilege of attending this convention would do much to encourage and interest him to be more active in the administration and executive work of his Society. More young people would prove valuable here for the exchange of ideas. Juniors have proven themselves capable of carrying home interesting and educational reports.

4. *Does your Society have the participation of a high percentage of juniors within its district?* Many Societies, I feel, have a limited number of the possible junior exhibitors participating at their Fair. Look around for ways and means of reaching the non-participating young people. Spend some time discussing the problem at the next board meeting. Call in representatives from the existing junior organizations in the district to study the possibilities of greater junior co-operation.

5. *Are your junior classes suitably adapted to the interests of the juniors of the district?* Many boys and girls not interested in showing livestock or grain would take part in tractor driving and farm machinery safety cometitions or woodworking classes.

6. *Do you allot suitable space for your junior exhibits and displays in buildings and grounds?* Sometimes the junior department is crowded into an unwanted corner of the building or grounds. While the horse show, with the aid of a loud-speaking system, carries on in the main ring the junior's calves are shown behind the barn without any amplifier to attract the crowd. At our Collingwood Junior Fair, of which I am chairman, we are provided with a loud-speaking system for announcements and commentations about the junior classes while they are being shown. This adds greatly to the success of the Junior Fair.

7. *Is provision made in your prize list for exhibits and displays from the rural schools?* School children's interests are attracted if provision is made for either a competitive or non-competitive display class for rural schools. Many a young school student has taken the rest of the family to see the display from "his"

school. It is wise to seek the advice, guidance and co-operation of the rural school teachers, principals and inspectors. These people are always willing to help in junior educational activities.

8. *Does your Society sponsor a Boys' and Girls' Club, such as Garden, Swine, Calf, Grain, etc.?* Statistics show that well over sixty per cent of the Boys' and Girls' Clubs of Ontario are sponsored by Agricultural Societies. Societies sponsoring these clubs benefit in many ways. These youthful exhibitors attract many parents and friends on Fair day. The club achievement classes add greatly to the livestock and field crop classes of the Fair. Due to the careful training a boy or girl receives as a club member they are most likely to continue to be exhibitor patrons of the Fair year after year.

9. *Does your Society sponsor a "Junior Fair" with sections and classes for all ages up to twenty-six years?* I would suggest that if an Agricultural Society were planning to set up a "Junior Fair" or the already existing Junior Fair needed stimulating they would solicit the co-operation of the local or county Junior Farmer Association. The Junior Farmer Club can be the medium by which the Agricultural Society reaches the juniors of the district. I would like to use as an example of how effective this method can be, our own South Simcoe County Seed Fair. The directors desired to have junior classes at their Seed Fair. The old question arose, "How will we attract the interest of the junior farm boys who have little or no experience in preparing and exhibiting grain?" They asked the four existing Junior Farmer Clubs in the county for their co-operation, and along with providing special junior classes at the Seed Fair they offered a substantial prize to the club having the greatest number of exhibitors from within their membership. In order to interest and train their members the clubs spent an evening with educational instruction on preparing seed for show. This particular instance not only helped the Seed Fair, but it also was another medium by which the rural young people received experience and training.

A junior farmer group in this province which has been outstanding in Junior Fair accomplishment is the Maryboro Junior Farmer Club in Wellington County. They have sponsored and carried out successfully for the past two years a Junior Fair apart from any senior Agricultural Society. If a group of junior farmers can do this on their own how much easier the same accomplishment would be if an existing Agricultural Society was co-operating.

In many cases in Ontario local Junior Farmer Clubs set up educational displays dealing with subjects such as soil conservation, improved pasture methods, weeds and their control, etc. Time does not permit to mention the numerous other ways Agricultural Societies can co-operate with a Junior Farmer Club in a Junior Fair.

10. *Are your senior directors and members doing an adequate job of making the junior exhibitors feel themselves to be an important and welcome part of the Fair?* It is my own personal observation that a better job of public relations could be done by senior directors and members as far as junior exhibitors are concerned. Often the senior directors seem uninterested or too busy to chat with and get to know the junior exhibitors. A junior always appreciates a word of encouragement.

A very worthwhile method of recognizing junior exhibitors is used by Beeton Agricultural Society in South Simcoe. A short time after the Fair the Society provides a banquet and social time for all the junior exhibitors of their Fair. At this time awards are presented. This gesture on the part of the Beeton Agricultural Society is very much appreciated by the juniors. The interest and good will created cannot be over-estimated.

In closing, I wish to congratulate the Agricultural Societies in Ontario for the extent to which they have included the rural young people in their program in the past, and hope one of their main objectives for the future will be "co-operating with juniors".

Beef Calf Club Champions

(Right): Duncan Campbell of Moffat, holding winner of King's Guineas, Royal Winter Fair, 1949; (left): Vera Jaques, of Jarvis, holds the reserve champion.

THE JUNIOR BUILDING AT BRAMPTON FAIR

Keith Shaw, Brampton, Ontario.

On behalf of the Junior Farmers of Peel County I wish to thank your secretary for the kind invitation extended to me as president to outline our program, particularly the activities in connection with Brampton Fair and our new building.

At the outset I would suggest that the motto of the Ontario Junior Farmers, "Self Help, Community Betterment", probably has an influence on any programme which we undertake in that there has been an earnest desire to help ourselves and at the same time be of maximum service to our community.

Our building program has been strictly a Junior Farmer and Junior Institute project; not one of those organized and supervised by seniors with a bit of junior assistance.

The only guidance or help we have received has come from our Agricultural Representative.

To show why it has been built perhaps I should go back four or five years and tell you briefly of the facilities and the exhibits our Juniors presented at the Fair at that time.

In those days the Junior Farmers were not so active in Fair work. However, we did have our Calf Clubs and the girls their Homemaking Clubs. There were no inter-club exhibits as we have today. The girls' Homemaking Club exhibits were set up in a hall together with Women's Institute and commercial displays. The girls attempted to put on skits and demonstrations, but the commotion in the other part of the building drowned out anything the girls tried to put across.

Just about that time grants to Class "B" Fairs for the Junior Farmer prizes were reinstated. The Fair Board secretary approached our Agricultural Representative and Home Economist about the probability of a junior show. A prize list and programme was soon drawn up, but our problem was suitable accommodation. There was an old hall which at one time had been headquarters for the women's exhibits, but during the war the building had been taken over by the poultrymen for their show.

After some negotiating this building was allotted to the Juniors. When we went into it first it had every appearance of a dilapidated hen-house. The boys got busy, replaced broken windows, repaired doors and steps, and in their spare time painted the building inside and out. At Fair time things were spick and span and we put on a show with sufficient exhibits to fill the building. We received much favourable comment on this show.

This created a desire to have Junior Farmer building, not only for our Fair, but for all our activities—short courses, meetings, dances and banquets. We considered remodeling this old building into a permanent quarters with heating, kitchen and workshop facilities.

Next we started to investigate ways and means of raising funds. We approached the Department of Agriculture and were given a cordial reception and obtained an assurance of financial assistance. We decided then to concentrate on

building a new hall on the Fair Grounds, suitable for all Junior activities and also serve as a rural community centre where different agricultural organizations might hold meetings and demonstrations.

Local clubs agreed to canvass the farmers in their districts and the county executive looked after the councils in the county as well as business establishments. The local clubs had each pledged $100.00 to the fund, and it was surprising how quickly we accumulated a substantial sum of money.

By January, 1949, we had in the building fund over $13,000. and promises of more. This sum had been realized through a lot of effort on the part of the Juniors themselves.

Perhaps you might be interested in a few of the figures. The Juniors, through the rural canvass had collected almost $4,000. The Women's Institute had contributed $425; count and township councils granted us a total of $2,750; local and county club donations amounted to $1,700., and the Provincial Government grant $5,000.

While building costs were at a peak it was hard to decide on the type of building best suited for our wide range of needs. After much thought and investigation we decided on a quonset type of building 50 x 100 feet. This building is constructed of laminated fir rafters and is sheeted with steel roofing. The front and part of the sides are finished in wide clapboard siding and straited plywood.

The interior layout includes an auditorium 50 x 70 feet—Fair Board office, meeting room, lounge, washrooms and a kitchen. Above this office-lounge section is a mezzanine with a snack bar and check room.

By Fair time we had our building up and washrooms finished, but no other inside construction completed. Just prior to the Fair we held an opening dance at which we made over $500. We also held a dance on the last night of the Fair and realized over $350. This was something new at our Fair.

Our building was well filled, the Juniors occupying over two-thirds of the space, with the remainder given over to the Women's Institute exhibits. Together with our usual type of programme and exhibits we have a very strong inter-club department. These exhibits reflect a good deal of planning and work on the part of club members. Judging is based on points for choice of subject, appeal, presentation and quality of design. Other inter-club exhibits are vegetable displays and flower and fruit displays. The girls' homemaking clubs do not put on skits or demonstrations and all their exhibits are graded. We also had large entries in the individual classes.

Our Fair Board was able to secure a grant from the Dominion Department through a plan of assistance set up for Class "B" Fair building programmes, and as a result we were able to complete the interior of the building.

With seven local clubs in the county showing a great amount of enthusiasm we used their help to good advantage. A volunteer group wired the building according to a plan drawn up by the Ontario Hydro Commission.

The materials for lining and insulating have been purchased wholesale by a builder in the county interested in our work. With a carpenter hired to superintend the job the local clubs have sent in volunteer gangs each day to work on the

building during the past five weeks. We have even received some help from retired farmers in the town. The girls have volunteered to help out with the painting, and we'll soon be able to move in the furniture.

Some of you may wonder how such a programme could be developed and carried on by the Junior Farmers. This is where the Agricultural Representative plays an important part and a great measure of credit is due to our Agricultural Representative, Bruce Beer. He has always tried to direct us in the best way, at the same time giving responsibility to the Juniors themselves. While we have made mistakes, I believe they have been kept to a minimum through his guidance.

The Junior executive have worked very hard on this building program and have given a lot of time unselfishly. Strong Junior support is very important in any project, but particularly so in one like this. Also, satisfactory Junior-Senior relationship is necessary. The measure of success in this regard has been due to the willingness of our Fair Board to allow us a free hand in our Junior program.

This building has been uppermost in the minds of many in the county for some time and we have worked closely together all during its construction. As a result this project and our Fair cannot help but mean a great deal to us the rest of our lives.

We trust that in this work we shall be applying our motto, "Self Help—Community Betterment" once more.

Holstein Calf Club Exhibit, New Hamburg Fair.

SUMMARY OF GROUP DISCUSSION ON BOYS' AND GIRLS' CLUB AND JUNIOR FARMER PROGRAMMES

Don C. Ross, Beaverton.

THE discussion was under the direction of Mr. George Gear of Walkerton.

After a brief introductory address, Mr. Gear evoked considerable discussion from those present, in the course of which it was disclosed that Junior Farmer and club work activities are increasing all over the province. It is high time that Fair Boards either start or increase their support of them. Club work is a democratic project and should receive more help from the community and the Department of Agriculture. Besides the more familiar branches of club work, twenty tractor clubs and thirteen forestry clubs were organized in 1949.

It was thought that ex-club members should become group leaders. They have had the advantage of previous participation in club work. They usually prove to be live wires and most popular in the group they help to organize and develop. The majority of Societies have left too much work to the Agricultural Representative. He should be responsible only for organization and direction of its leaders.

Considerable discussion took place in regard to extending the Calf Club to include yearlings and two-year-olds, especially in the dairy districts. Following this the group suggested that additional grants be forthcoming from the Department of Agriculture in order that this work might be advanced.

There was a general feeling that presentation of prizes for club work should be made publicly either on Fair day or at a special social function. In this manner they might convince the public that the extensive work of club members and Junior Farmers have a desirable affect on the Fair and community. Junior Farmers should appoint their own directors and manage their own department of the Fair.

The theme of the discussion group was "Good Leadership and Complete Co-operation of Fair Board with Junior Club Activities". In this way Fair Boards may realize the value of sponsoring Junior projects in their respective communities.

SUMMARY OF GROUP DISCUSSION ON COMMERCIAL PRODUCTION FEATURES

Howard Giles, Almonte, Ont.

ORGANIZATION

DR. A. E. CAVANAGH outlined procedure followed by Carp Agricultural Society in their feeder cattle feature. An active committee composed of two cattle drovers and a director was appointed. Spot announcements were carried on local radio stations for two weeks, also advertisement in the local paper. Exhibitor was required to have six steers, four to be shown at local Fair. Entries closed May 1st, and all cattle entered were branded to prevent possible changes at later date.

Mr. Wilfred Down, of Strathroy, explained that their Society handed the project over to the Junior Farmers and the resulting display was varied with several farm products given prominence.

Mr. W. A. Malcomson of the Barrie Society described a verv extensive and educational display in potatoes. Land available on Fair grounds was ploughed in the spring and turned over to a prominent potato grower to seed with different varieties of potatoes. Several types of fertilizers were used and blight and seasonal diseases were controlled. During the Fair the most modern machinery for digging and grading potatoes was used to harvest the crop. Records were kept during the season and were available for inspection by the public. This feature showed the possibilities of what might be done in an educational way.

Mr. M. C. McPhail, Principal Kemptville Agricultural School, suggested that milking barns might be a possible feature. A second feature might be the proper ventilation of cattle barns; the latter, he believed, was sorely lacking in barns throughout the country.

DISPLAY ARRANGEMENT

Mr. Charles Thorn, of Galt, told of display arranged at their Fair consisting of four Jersey cows stabled in most modern type of barn under most sanitary conditions. Milk was shown in all possible forms and uses. This feature was not competitive in any way.

Mr. Howard Gallagher explained how the apples were arranged at Waterdown. Prizes were given for best hamper of apples and a special display of apples cooked in different ways. The latter part was not competitive.

Suggestions from the floor were:

Ample lighting on display.

An attendant on duty to answer questions by the public.

Posters to call attention to the display.

PRIZES AND EXPENSES

Mr. Gordon Stobo, of Teeswater, explained that their original feature in feeder cattle was ruined by the drought last summer, and one in baby beef was held instead with graded prize money. The regular judge for beef cattle handled the placings and only a small amount of money was used for advertising and posters.

Mr. Russell Bolton, of Seaforth, explained that most of their money was used for prizes in their egg and poultry feature with a large number of classes covering public school, high school and senior entries. There were exhibits of live and dressed poultry in all breeds.

A certain amount of criticism came from some delegates who believed that a number of features were of a competitive nature and had no educational value.

Prize money was mostly graded, but a few had flat prizes across the board with placings for honour only.

The discussion gave the impression that possibilities for commercial production features were unlimited and most delegates thought that more emphasis should be placed on educational rather than competitive value.

SUMMARY OF GROUP DISCUSSION ON FIELD CROP COMPETITIONS

W. B. GEORGE, Kemptville.

1. The question regarding the availability of seed secured from competitors of Societies conducting competitions being used for the second and third years was brought up. It was answered that this was permissable and advisable providing the original competitor has had his field inspected and crop registered. It was strongly recommended that all Societies use registered seed only, thus eliminating mixtures developing. Treatment of seed was advocated to control disease.

2. Some Societies reported difficulty in securing sufficient number of competitors due to the fact that following the conducting of a competition the majority of Society members and other farmers in the district have secured their seed from the members of the original competition and appear to be satisfied that the particular variety is best suited to their conditions. It was suggested that in such cases competitions in other crops could be conducted.

Judges at Work, Burford Fair.

3. Some discussion took place regarding the organization of a field crop competition within the Society. It was felt that the most ideal method would be for one director of the Society be chairman of the crop competition and also chairman of the seed section of the Fair. It would be his responsibility to have the members circularized regarding the rules, regulations and advantages of the competition and follow this up with as many personal contacts as possible. The interest should not terminate with the field competition, but should be carried on through to the display and showing of samples at the Fair. If desirable, additional prize money could be offered or have the stipulation that the field crop competition is only one part of the complete project. It was also suggested that sheaf competitions be conducted as well as grain exhibits.

4. One important suggestion was brought forward regarding the judge's report. It was felt that the present procedure did not permit the various competitors to find out just where they fell down in their competition. It was recommended that if possible a copy of the judge's scoring be returned either to the competitor or to the Society secretary, who would be responsible for supplying same to competitor.

5. In the main the judges appointed were satisfactory although one Society experienced difficulty in contacting judge when the fields were ready for judging. Another Society reported the judge too hurriedly examined the various fields, and in majority of instances did not go through the field, but attained his decisions from the side of the field or by entering the field a very short distance.

6. It was strongly recommended that the field in competition be identified to enable judge to know which field is in competition. This can be done by the competitor letting wife or hired man know and if possible the Society secretary. The use of signs available from the Department was also strongly recommended.

SUMMARY OF GROUP DISCUSSION ON FAIR ORGANIZATION AND MANAGEMENT

R. A. Templer, Burford.

OUR session was well attended. At one time 85 were present. All delegates seemed very interested and eager to enter the discussion.

The Chairman, Mr. O. F. Villeneuve, of Maxville, opened the meeting by giving a very fine outline of how his local Fair a few years ago had been almost out of existence but by reorganization and proper management had been brought up to one of the best in the district.

The ensuing discussion covered many phases of Fair management, chief of which was horse racing at Fairs. Some delegates reported they had very successful Fairs for years without any horse races. Other delegates stated their experience had been that the public had to be entertained and horse racing seemed to be the best drawing card and when races were discontinued the attendance fell off materially. Mr. Climie, of Tillsonburg, pointed out that if your race track was

not properly protected your liability insurance did not apply. The only conclusion reached was that if a Society has not a good track and grandstand, it is better off without races.

Most delegates were of the opinion that it was very wise to have a Fair manager. Presidents change often, but a manager is more permanent and has a better opportunity of guiding the policy of a Fair and suggesting suitable changes from year to year.

Mr. Pond, of Simcoe, warned all Fair Boards to look ahead and make sure they had plenty of grounds for expansion before it was too late. He also stated it more profitable for all concerned to have manufacturers and retailers stage displays on the Fair grounds rather than clutter up the prize list with a lot of advertising.

In determining the amount of prize money a Society should offer it was felt a good rule to go by was—"the gate should pay the prize money and the entertainment should pay its own way".

THE OUTLOOK FOR AGRICULTURE IN CANADA

W. P. WATSON, Ontario Livestock Commissioner.

AT this time last year Canadians were deploring the fact that British contracts for bacon, cheese and eggs had been reduced by almost 50 per cent. Some farm leaders were so pessimistic about the situation as to predict that depression was just around the corner.

In spite of these gloomy forecasts the national farm income was about 2.4 billion dollars, just a few million less than in the peak year of 1948. The decline was due to poor crops in many parts of Canada rather than to any dislocation of markets created by reduction in export contracts.

In recent weeks the farm outlook for 1950 has occupied prominent space in all daily papers. However, most of the forecasts have been very disappointing to the farmers; so much so that the pessimistic now feel sure that the depression is almost here. The plain facts are that world food production is now above prewar levels. Hence importing countries can be more selective and discriminating in chosing imports. As a result Canada is experiencing greater difficulty in finding export markets for her surpluses and particularly in convincing Great Britain that she should continue to purchase large quantities here at prices above those being asked by other countries that have surpluses to sell.

For as long as most of us can remember, Britain has been the largest importer of foodstuffs in the world, while Canada and the United States have been the largest exporters. An export market is more important to Canada than the United States because our surpluses, although smaller in total quantity, make up a much larger percentage of our total production.

Throughout the years Great Britain has provided our most important market. She has also played a major role in development of this country. Most people in Canada proudly point to the fact that their ancestors came from the British Isles

While Britain was exporting immigrants to this country, she was also investing dollars. By 1939 investments in North America had reached the point where interest therefrom paid for well over 60 per cent of the food purchased on this continent. Under such circumstances, Britain did not have to sell large quantities of manufactured goods here to balance her trading accounts. This left her relatively free to explore and develop markets in other parts of the world, and to establish her reputation as the greatest trading nation in the world.

Unfortunately the war changed that situation. For over two years Great Britain and her Dominions fought alone. In order to purchase equipment and foodstuffs needed to fight a total war, Britain was forced to liquidate most of her dollar investments. As a result of this forced action the interest accruing from those that remain will pay for only a small portion of what she would like to purchase from this country. Moreover, such expedients in international financing as mutual aid and Marshall aid are rapidly diminishing and are being replaced by more orthodox methods.

It must now be obvious to every Canadian that Britain cannot continue to purchase large quantities of foodstuffs and pay for them in our kind of money unless she is given an opportunity of earning that money by selling more goods in dollar countries.

It must be equally obvious that loss of British market for Canadian products will have serious repercussions on the agricultural, economic, and eventually the whole economy of this country. Canada must, therefore, import more from Britain. This does not necessarily mean an increase in overall imports, but rather a transfer in source of supply for goods purchased outside this country. Britain, on the other hand, may find it necessary to change her tactics in selling all over the world, and concentrate on sales in North America.

Failure to solve monetary differences between the two countries leaves Canada with the alternatives of seeking markets elsewhere or reducing production more in line with domestic demand. The task of finding alternate markets in a world in which most countries possessing dollars have surpluses of products similar to Canada's is well nigh impossible.

Reducing production in a country with such potentialities and with such a relatively small consuming population is unthinkable, but nevertheless it might have to be done in the case of products that leaped into prominence during war years.

Canada's greatest tract of agricultural land lies in the three prairie provinces and a solution to present difficulties might be arrived at if markets could be found for these large surpluses produced in Western Canada.

The prospects are fairly bright for the next two or three years. This is based on the assumption that responsible countries will carry through undertakings they have assumed through signing of international agreements.

For the past four years Canada has been selling wheat to Britain under a bilateral arrangement made in 1946. This agreement terminates with the present crop year, which year also marks the first one covered by the international wheat

agreement. Under terms of the bilateral agreement Britain will purchase 140,000,-000 bushels at $2.00 per bushel in 1949-50. Because of a special arrangement between the two countries, Britain will take less than that quantity this year and will divert the dollars saved in so doing by the purchase of bacon, cheese, fish and base metals.

Russia and Argentina are not signatories to the world wheat agreement and are not bound to sell within any fixed price schedule. Although Russia is a large producer, she has seldom produced enough wheat to feed her own people. Argentina, on the other hand, normally has large surpluses. Any attempt on her part to offer large quantities at less than the minimum price might prove a threat to stability of the agreement, but that threat is not likely to materialize as long as the world is short of bread.

Contracts for livestock products plus Government subsidies or floor prices are at rates approximately ten per cent below those prevailing last year. The mere prospect of lower prices will undoubtedly discourage production of livestock in some parts of Eastern Canada and sooner or later bring about a closer relationship between supply and demand.

A sharp liquidation in poultry flocks has already taken place and the number of sows marketed since the first of the year has registered an increase. If this trend continues much longer the balance between supply and demand may be reached sooner than expected and Canada won't have to worry about surpluses of bacon or eggs. As in the past, the farmer who follows a consistent line of production will win out in the end.

This is no time for panic but rather a time for careful planning. The farmer who intends to raise large numbers of grain-consuming animals would be well advised to increase his grain acreage and at the same time follow those practices which tend to produce maximum yields.

Livestock prices are still above those prevailing in most parts of the world and perhaps a great deal higher than they will be two or three years hence.

It might be well to do a little careful culling now. There are no evil omens visible to any alarming degree as we enter the second half of the twentieth century, a half century in which Canada will undoubtedly go forward to greater achievements in world affairs.

BRITISH AGRICULTURE LOOKS AHEAD

G. N. Ruhnke, Director of Research, Ontario Department of Agriculture, O.A.C., Guelph, Ont.

BRITISH farmers are currently engaged in the most intensive food production program ever attempted in the history of the country. One million odd farmers, with their families and hired men, are faced with the job of feeding one-half of the population of 50,000,000 people in those tight little isles.

But before we consider how British farm people are meeting this challenge we should look at the reasons behind this United Kingdom farm programme. Be-

fore the war, Britain was the world's chief importer of food. Approximately two-thirds of her food requirements were produced in other countries. She paid for these food imports by the earnings from her foreign investments, her merchant shipping and the exports of her manufactured products.

Britain emerged from the war with an estimated loss of $12 billion of her physical and financial assets, more than half her merchant fleet, and almost complete exhaustion of her overseas assets. This loss of overseas investments and earning capacity greatly weakened her overall economy, and left her faced with the fact that, for some time to come, she will be able to spend abroad only what she can earn from the sale of her exports. While Marshall aid has been giving invaluable breathing space before the country must fall back on its own resources, it is obvious that this is only a temporary measure.

The long term program, submitted by the United Kingdom Government to the Organization for European Economic Co-operation, plans that by 1952-53 Britain's exports will have increased 50 per cent by volume above 1938. Even on this level, it was anticipated that the country would be able to afford imports only at about the same level as 1948-49, which is 15 per cent less than in 1938. Since imports of essential raw materials needed for manufactured products for export cannot be reduced, the necessary reduction in purchases from abroad must fall on food imports. To save dollars the United Kingdom has had to replace food supplies from abroad as far as possible by increased home production.

The seriousness of this position was aptly expressed in a government press release which pointed out that "even if export targets are achieved in full, the nation cannot, except through a large expansion in agricultural products, simultaneously provide itself both with foodstuffs to produce an adequate diet, and industrial raw materials, to sustain the level of employment; and without the utmost efforts of the agricultural industry, either undernourishment or widespread unemployment may have to be faced. The responsibility resting on the Government, on the farmers, farm workers, and landowners, is thus a grave one."

Targets For 1951-52

Before the war, Britain fed less than a third of her people with the produce of her farms. Now it is essential that she produce more food at home to try to feed one-half of her population. Thus by 1952, it is intended that the net agricultural production will have been increased by 50 per cent more than was produced in 1938. The objective is to make each acre of farm land yield one and a half times as much in 1952 as it did before the war.

As might be expected, the emphasis has been placed deliberately on dollar-saving products. While it is true that all home-produced products save dollars, particularly important are pig meat, eggs, beef, mutton, cereals, and linseed. Thus the present agricultural program focusses attention first on livestock and livestock products, which the country is so well adapted to produce, and which offer the greatest scope for saving dollars.

The main limiting factor is shortage of bread grains and animal feeding stuffs. Since the United Kingdom can no longer afford to buy the same quantities

of bread grains and cattle foods which she purchased before the war, she must maintain higher crop targets, so that supplies of food for direct consumption will be safeguarded, and provision be made also for increased numbers of livestock.

Agriculture Patterned on Land Resources

To appreciate fully the reasons for the present pattern of Britain's agricultural program, we should consider, briefly, her climate, physical features, and land resources.

In latitude, the United Kingdom lies with its southern tip on the fiftieth parallel, or slightly north of Hearst, in Northern Ontario, and its northern boundary at the same latitude as the tip of Labrador. However, being surrounded by seas, it has a mild climate, with little freezing in winter, a moderate temperature in summer, and a relatively long growing season. The rainfall varies from 80 inches in the western mountains to only 20 inches in the eastern lowlands. The moisture in the main falls gently, although summer showers of high intensity do occur in the southern portion.

Physiographically, the country may be divided into two parts, one on either side of a median line drawn from north to south. On the west side, high, rough hills are interspersed with fertile valleys, while the east has mainly low flat land. Northward, the hills extend further east, until in Northern Scotland they cover practically the whole country.

In England and Wales there are slightly more than 24 million acres of land cultivated under crops or grass, and divided into 290,600 separate holdings. The types of farming vary widely, with differences in soils and climate, from the arable farming of the fertile plains of East Anglia and Lancashire, to the grazing and dairying on the Midland pastures, and the hill-sheep farming of Wales and Northern England. However, dairying predominates, for it is at least of substantial importance on nearly half the farms and over nearly half the cultivated area.

Of Scotland's 19 million acres, only about 4½ million are tillable; of the rest, 11 million acres are rough hill grazings; about 3½ million acres are mountain land, capable of supporting little but deer and game. There are, broadly, three main types of farming in Scotland. Along the east and northeast coasts, arable farming with livestock rearing and fattening predominates; in the southwest, dairying; and in the highlands and islands, hill-sheep and cattle farming, and "crofting"—the cultivating of hereditary small holdings.

Northern Ireland is about one-third rough mountain grazing and forest country. The total of three million acres of agricultural land included in 1948 about 2.3 million acres in crops and pasture. Arable crops occupied 1.1 million acres, an increase of 22 per cent over the 1939 acreage. Normally approximately 80 per cent of the total agricultural income is derived from livestock and livestock products. The principal crops grown are potatoes, oats, flax, and ryegrass, for seed.

Tools For the Job

Having placed before the agricultural industry the challenge of a greater productive effort than any time before, the Government has proceeded to make avail-

able the "tools for the job" through the Agriculture Act of 1947, designed to provide the essential foundations of a stable and prosperous agriculture. In the words of the Minister of Agriculture, "it aims at fulfilling the pledges that we have always made to restore prosperity to an industry that has suffered over 20 years neglect and to ensure a right use of land in the public interest".

The essential features of the Agriculture Act are as follows: It provides for the stability of the industry by means of fixed prices and guaranteed markets for three-quarters of the produce the farmers have to sell. Each February the farmers' representatives and the Government officials sit around the table and settle on the future prices. These are guaranteed so that the farmer knows in advance what he is going to get. Crop prices are fixed from one to two years ahead. Minimum prices for livestock and livestock products are fixed from two to four years ahead, with the actual price set about one year ahead. In this way, farmers when they sow, know the price at which they will reap. They can plan ahead with confidence and work out their production plans without having to worry about marketing problems.

But the Act makes demands on the farmers in return for the assured markets and guaranteed prices. It requires that minimum standards of good husbandry and good estate management should be practised by all farmers and landowners. In the face of the urgent need for maximum production of food, there must be efficient management of land, and no wasteful use of natural resources can be tolerated.

The Act gives absolutely security of tenure to a tenant, save only when he goes bankrupt, or is guilty of bad farming. The full significance of this provision is appreciated when we remember that two-thirds of Britain's farmers are long-term tenants, who pay a fixed cash rent. The average farm tenancy period is 21 years, that is, four years longer than the average duration of ownership in the United States. A tenant farmer, to do his best, needs the assurance that he will be compensated for capital improvements (fencing, liming, etc.), and that the landlord will not turn him off his farm without good reason or compensation for inconvenience.

The Agriculture Act also provides for the British farm people to run their own show, by means of County Agricultural Executive Committees. These are successors to the County War Agricultural Executive Committees, are established now on a permanent basis, and function to help farmers increase the output and operate at the highest level of efficiency.

The County Executive Committees consist of twelve members—five appointed by the Minister of Agriculture, seven by the Minister from names submitted by farm groups—three from the National Farmers Union, two from the National Union of Agricultural Workers, and two from the Central Landowners Association. One farmer (in some areas two farmers), in every hundred, are members of these local bodies of self-government. Through these committees (and their sub-committees), farmers, farm labour, and landlords, play a big part in planning and administering farm programmes. The members of these committees, which are almost entirely drawn from the local farming community, help those farmers who want help, and keep a keen eye on those who need help but will not seek it.

It is the job of the county communities to get the national programme across to the farmer, administer regulations, to make the farmer's problems and grievances known to the Ministry, and to make certain that individual farmers are doing their best.

These committees are empowered to dispossess inefficient farmers from their farms after all other methods of increasing their efficiency have been tried. The country can no more afford the misuse of land now than she could during the war. Every acre is precious, and all resources must be widely used.

It is not a Government Minister who sits in judgment—but a farmer's own neighbours, members of his county committee. Where a farmer or landowner refuses to rise to the required standards of farming, the County Executive Committee can put him under supervision for one year, and if no improvement, the committee may (with the approval of the Minister of Agriculture), dispossess him ; but he has the right of appeal to an independent land tribunal, whose decision is binding.

While dispossession is the protection against inefficiency, the power is exercised only as a last resort, after all possible efforts at help, advice and persuasion have failed.

Farmers and landlords have accepted this policy on the grounds that in return for financial stability in the form of fixed prices and assured markets given them by the Government, they owe the assurance that their land will be farmed efficiently. Apparently the democratic rule is honoured. By the end of 1948, the Agriculture Act of 1947 had been invoked to dispossess only 40 farmers, and these were not farmers in the proper sense of the word.

Agricultural Extension Services

Since minimum standards of farming are required under the Agriculture Act, it is of fundamental importance that the farmers at all times have easy access to the best of scientific information and technical advice.

To this end the Act has provided for the establishment of a new National Agricultural Advisory Service, which works in close co-ordination with the County Agricultural Executive Committee, at the farm level. This advisory service is the main link between the experiment stations, universities, agricultural colleges, research institutes, and the farms.

It differs from our extension services here in two respects. First of all, each provincial headquarters has its own staff of specialists in soils, chemistry, entomology, plant pathology, bacteriology, nutrition, horticulture, poultry, husbandry, livestock, grassland management, and farm buildings. Each of the science specialists has a well equipped laboratory with a staff of assistants and technicians. Similarly, under the provincial headquarters, each county has an Agricultural Advisory Officer, with a somewhat similar staff of advisory specialists, located at the County Advisory Centre. Finally, each county is divided into districts, each of which has a District Advisory Officer, who has a broad training and experience in a variety of subjects. There is one District Advisory Officer to each 1,000 farms. The District Officer gives mainly day-to-day advice to the

farmers. Where he encounters special problems, he calls in the assistance of the County Advisory Officer, and his specialist in whose field the problem lies. If the problem is of a more technical nature still, the assistance of the Provincial Advisory Centre specialists is called upon and the problem referred to them for study and solution. By this system, the farmer's problems do not wait for attention. The staff of highly trained specialists can devote its whole time to "trouble-shooting" on the farm front.

Mention should be made of the fact that the National Agricultural Advisory Service is not the sole technical service of the Ministry whose work is concerned with the promotion of efficiency in agriculture. The veterinary service of the Animal Health Division is responsible for work in the field of prevention, control and eradication of animal disease. All dairy herds are subject to official veterinary inspection at least once a year; many herds are inspected more frequently.

The diseases mainly responsible for losses in dairy herds are being dealt with by three voluntary schemes. Tuberculosis is being attacked by the establishment of tubercle-free herds under the Tuberculosis (Attested Herds) Scheme. Contagious abortion is being fought under a low-cost Calfhood Vaccination Scheme. On the payment of a flat rate fee, The Scheme for Control of Disease in Dairy Cattle, enables a farmer to obtain advice and treatment from his veterinary for mastitis, contagious abortion, sterility, and Johne's disease. The State provides for herds in the scheme a free laboratory service for diagnosis and free materials for treatment.

Theory Wed to Practice

That British farmers have applied the results of research, and made use of technical advice in the past, is evidenced in the high yields of their main crops. In the past ten years, the *average* yield of wheat has varied only between 30 to 38 bushels; barley between 33 and 40 bushels, and potatoes between 290 and 350 bushels. All of these average yields are twice as high as those of the United States and Canada, and are achieved without irrigation. I visited one farm in the County of Norfolk fenlands, which produced 78 bushels of wheat per acre in 1948. Less than 60-65 bushels per acre on the average would be disappointing. On the same farm the average yield of potatoes is around 350 to 400 bushels per acre.

United Kingdom authorities claim that the reasons for these high yields lie not only in the mechanical equipment employed on farms, the high population of livestock, the genetic improvement of grasses and crops, the soil-building practices traditional throughout the country, but as well, to the inherent good husbandry of the farmers.

Crop rotation is an established principle. One cleaning crop, usually a row crop, is included. Farmers generally use a dressing of ten to fifteen long tons of farmyard manure per acre once in each crop rotation, usually applied in preparation for the row crop. All farmers apply liberal dressings of commercial fertilizers to all crops and grass.

That British farmers are fast repairing the neglect of two decades before the war is evident from the rapid mechanization which has taken place since.

There is now one tractor for every 67 acres of arable land—in all 275,000 tractors on United Kingdom farms—five times as many as in 1939.

Thirty per cent of the farms have electricity, and there is one milking machine for every 60 dairy cows. A vigorous programme of research and testing in connection with farm machinery is putting the United Kingdom agricultural engineers in the forefront of this field. The industry has developed a machine of some kind for nearly every operation on the farm. The farms are mechanized as much to beat the weather as to save labor.

The necessity for using all suitable land possible for arable crops, and the shortage of imported feeding stuffs, has put unusual emphasis on the improvements of grassland throughout the country. "Permanent" grass has given way to "short term leys" in the new grassland agriculture. Improved species of pasture grasses and clovers are replacing the old natural swards. In South Devon I visited a typical farm where it is customary to graze three bullocks per acre from April to November and obtain gains of 650-700 pounds of beef on each acre.

We have still a long way to go in bringing about the wider use of fertilizers on our grasslands in this province. The British agronomists have worked out their fertilizer practices on a scientific basis and the good grassland farmer applies lime and other plant foods at regular intervals in relation to the soil and herbage needs. No wonder they can produce so much meat and milk per acre!

The preservation of the surplus highly nutritious grass by dehydration or by the use of pit, or trench silos, is becoming of major importance in the livestock feeding programme. This home-grown high-protein-mineral-rich concentrate is rapidly taking the place of pre-war imported feeding stuffs which have now been reduced to about one-half the former volume.

Despite the difficulties imposed by the replacement of imported by home-grown feeds, the livestock population has shown a substantial increase. The number of cattle in England and Wales has risen from 6,770,000 in June, 1939, to 7,680,000 in June, 1949. Moreover, the number of poultry of all kinds has increased from 56,426,000 in 1939 to 60,975,000 in June, 1949. The number of pigs, however, reflected the shortage of animal feed. In June, 1939, there were 3,515,000 pigs, which number dropped to 1,146,000 in June, 1947, but rose again to 2,120,000 in June, 1949. Similarly the number of sheep and lambs has risen from 10,162,000 in 1947 to 11,724,000 in 1949.

Sir James Turner, President of the National Farmers Union, in an address before the Royal Society of Arts, in November last, termed the extent of increased production as "considerable, but by no means the end of the effort, and even when we have achieved the level of production set for 1952, we shall claim no more than having reached the lowest level that ought to be maintained in this country for security and economic reasons."

Farmers Face Future With Confidence

Britain's farmers, though operating under programme directives and restrictive controls, have philosophically accepted the situation and are loyally supporting the policy enunciated by the Government and approved in principle by both parties in

the opposition. They are confident that they will come through the present transition period with their industry in an economically sound position and the general efficiency greatly improved over pre-war times.

More money is available for agricultural research and investigation than ever before at any period in the country's history. The farmers have confidence in their scientists in the research institutes, universities, and agricultural colleges, that they will continue to give positive and sound leadership to the agricultural industry.

The acceleration of the research programme, the parallel expansion of the advisory services, and the establishment of a larger number of farm institutes for education of farm boys and girls, combine to provide insurance that British agriculture is going ahead, come what may in the future. We will do well to keep in touch with developments in their farming science, for they are destined to be in the vanguard among the world's best farmers.

REPORT OF RESOLUTIONS COMMITTEE

Chairman, George W. Boyer, Bracebridge.

1. Be it resolved that this Association express appreciation of the splendid work done by our retiring president, Mr. E. H. Buck; our treasurer, Mr. M. B. Cochrane, and others who helped to make our convention a success.

2. Be it resolved that this Association extend to our worthy Superintendent, Mr. J. A. Carroll, and to Mr. F. A. Lashley and all members of their staff, our deep appreciation and thanks for their assistance in the work of our Societies, and other agricultural activities.

3. Be it resolved that the thanks of this Association be extended to the farm weeklies and daily press, and the radio, for valuable assistance given to our Societies throughout the province.

4. Be it resolved that we express our thanks to Mr. Joseph Connell, Kitchener; Mr. Bligh Dodds, past president International Association of Fairs and Exhibitions, of Syracuse, N.Y.; Mr. W. P. Watson, Mr. W. H. Porter, Mr. G. N. Ruhnke, and other speakers, whose addresses contributed so largely to the success of the convention.

5. Be it resolved that we express our appreciation of the excellent entertainment provided by Conklin Shows of Hamilton, and the artists associated with them.

6. Be it resolved that the very best thanks of this Association be extended to Col. the Hon. Thomas L. Kennedy, Minister of Agriculture, for his unfailing assistance to our Agricultural Societies, and to agriculture in general in this province, and that we extend to him our very best wishes.

7. Be it resolved that we extend our grateful appreciation for the generous assistance given our Societies by the Agricultural Representatives and other officers of the Department.

8. Be it resolved that we express appreciation of the courtesy and service provided by the management and staff of the King Edward Hotel.

9. Be it resolved that we acknowledge with deep appreciation the assistance to many of our Societies affected through the Community Centres Act, and also the special grants to Societies in Northern Ontario, which have helped in providing and improving our grounds and buildings. May we respectfully request that the Department provide grants on capital expenditure to County and Township Societies.

AGRICULTURAL SOCIETY STATISTICS—1949

Name of Society	*Gate Receipts*	*Leg. Grant*	*No. Field Crop Comp.*	*No. Jr. Clubs*	*No. Comm. Feat.*
ALGOMA					
Bruce Mines	287.75	322.00	1	2	......
Iron Bridge	54.35	125.00	......	1	......
North Shore	....	73.00	1	......	......
Thessalon	....	120.00	1	......	1
BRANT					
*Ohsweken	1,055.75	187.00	......	1	......
Paris	1,055.75	671.00	2	3	1
South Brant	1,296.00	487.00	2	1	1
BRUCE					
Arran and Tara	920.47	350.00	1	1	......
Carrick	716.00	319.00	3	3	1
Chesley	724.60	208.00	1	1	......
Eastnor	201.92	105.00	......	1	......
Huron Township	305.40	207.00	2	2	......
Kincardine	771.30	412.00	......	......	......
Lucknow	365.27	252.00	2	2	......
North Bruce and Saugeen	431.75	219.00	3	1	1
Paisley	400.00	248.00	......	1	......
Teeswater	5,680.65	800.00	2	10	1
Tiverton	483.00	88.00	......	1	......
Underwood	....	87.00	......	......	......
Walkerton	....	677.00	......	......	1
Wiarton	322.30	120.00	......	2	......
CARLETON					
Carp	2,313.45	677.00	2	1	1
**Central Canada Ex.	117,797.20	1,824.00	......	......	......
*County of Carleton	8,000.00	800.00	1	1	......
Metcalfe	4,355.12	686.00	1	5	......
Osgoode (Stock)	....	150.00	......	......	......
COCHRANE					
Clute	24.75	132.00	2	......	......
Cochrane	84.00	207.00	......	1	......
Porquis Junction	17.05	97.00	2	......	......
Matheson	....	....	2	......	......
Val Gagne	....	70.00	2	......	......
DUFFERIN					
Dufferin	1,390.00	553.00	1	1	......
Dufferin Central	721.23	203.00	......	......	......
East Luther	742.00	205.00	1	1	......
DUNDAS					
Chesterville and District	680.00	319.00	......	1	1
Mountain	917.60	396.00	......	......	......

Name of Society	*Gate Receipts*	*Leg. Grant*	*No. Field Crop Comp.*	*No. Jr. Clubs*	*No. Comm. Feat.*
DURHAM					
Cartwright	394.15	217.00	....	2	—
Durham Central	796.75	412.00	1	1	....
Millbrook	700.39	296.00	....		—
Port Hope	1,543.50	273.00	1	2	—
ELGIN					
Aldboro	900.37	228.00	....	2	....
**Aylmer and East Elgin	2,184.35	800.00	....	—	....
Southwold and Dunwich	325.00	136.00	....	2	....
West Elgin	1,373.75	451.00	1	1	....
Yarmouth and Belmont	234.70	172.00	....	....	....
ESSEX					
Colchester North (Stock)	....	75.00	....	....	....
*Colchester South	1,662.00	403.00	....	1	....
*Comber	734.16	110.00	2	....	....
Cottam (Stock)	....	175.00	....	....	....
**Leamington District	10,536.00	800.00	2	1	....
Oldcastle	....	135.00	1	....	—
South Woodslee (Stock)	....	175.00	....	....	....
FRONTENAC					
**Kingston Industrial	3,586.50	559.00	2	3	....
Parham	348.25	78.00	....	2	—
GLENGARRY					
*Kenyon	1,597.55	552.00	2	1	....
*St. Lawrence Valley	1,036.00	316.00	....	3	....
GRENVILLE					
Merrickville	974.70	108.00	....	1	....
Spencerville	1,208.86	323.00	....	1	....
GREY					
Ayton	259.00	125.00	1	2	....
Collingwood Township	245.60	194.00	....	....	—
Desboro	207.65	166.00	1	1	....
Dundalk	1,302.85	219.00	....	2	1
Durham	875.15	145.00	2	1	....
Egremont	112.40	154.00	1	1	....
Hanover, Bentinck and Brant	2,052.15	372.00	....	....	—
Holland	271.80	227.00	....	1	....
Keppel and Sarawak	18.75	67.00	1	....	—
Markdale	199.00	182.00	....	2	—
Meaford and St. Vincent	1,269.00	251.00	....	—	2
Normanby	12.10	164.00	....	1	—
Osprey (Feversham Fair)	48.00	120.00	....	—	1
*Owen Sound	5,468.00	800.00	3	3	—
Rocklyn	177.60	141.00	1	1	—
Sydenham	30.00	58.00	—	—	—
HALDIMAND					
*Caledonia	5,461.13	747.00	1	7	1

Name of Society	*Gate Receipts*	*Leg. Grant*	*No. Field Crop Comp.*	*No. Jr. Clubs*	*No. Comm. Feat.*
HALIBURTON					
Glamorgan	....	85.00	.....	.....	.....
Minden	425.42	178.00	.....	.....	.....
HALTON					
Acton	1,600.00	426.00	2	1	.....
Esquesing	1,192.00	411.00	1	3	.....
Halton	1,855.00	687.00	2	.....	.....
HASTINGS					
**Belleville	9,032.00	800.00	1	4	.....
Madoc	2,705.25	450.00	3	1	.....
Marmora	346.30	136.00	.....	1	.....
Mohawk	....	100.00	1	1	.....
Shannonville	734.35	83.00	.....	1	.....
Stirling	....	349.00	.....	1	.....
Tweed	1,006.40	154.00	1	2	.....
Wollaston	206.50	58.00	1	.....	.....
HURON					
Bayfield	122.40	116.00	1	.....	.....
Blyth	641.40	336.00	.....	.....	.....
Dungannon	540.25	134.00	.....	.....	.....
East Huron	864.00	248.00	1	2	.....
Exeter	1,775.05	441.00	1	1	1
Howick	554.75	222.00	.....	1	.....
Huron Central	1,297.15	557.00	.....	.....	.....
Kirkton	194.00	205.00	1	1	.....
Seaforth	831.90	430.00	1	1	.....
South Huron	133.70	144.00	1	.....	.....
Zurich	265.10	182.00	.....	.....	.....
KENORA					
Dryden	465.65	338.00	2	1	.....
Kenora	1,100.00	387.00	1	2	.....
KENT					
*Dresden	2,998.55	605.00	1	1	.....
Moravian	....	100.00	.....	.....	.....
Orford	302.66	205.00	.....	.....	.....
*Raleigh and Tilbury	513.30	128.00	2	1	.....
*Ridgetown District	3,361.50	498.00	.....	5	1
LAMBTON					
Bosanquet	354.46	169.00	1	1	.....
Brooke and Alvinston	949.00	389.00	.....	1	.....
Florence	213.35	162.00	1	1	.....
Moore	2,703.99	524.00	.....	1	.....
Petrolia and Enniskillen	....	144.00	.....	.....	.....
Plympton and Wyoming	317.12	231.00	1	.....	.....
Forest	932.20	353.00	1	.....	.....

Name of Society	*Gate Receipts*	*Leg. Grant*	*No. Field Crop Comp.*	*No. Jr. Clubs*	*No. Comm. Feat.*
LANARK					
Dalhousie	202.35	109.00	....	....	....
Drummond (Stock)	....	60.00	....	....	....
Lanark Township	327.75	139.00	....	1	....
Maberly	141.95	88.00	....	....	....
*North Lanark	2,926.97	557.00	3	3	1
*South Lanark	2,369.38	402.00	1	1	1
LEEDS					
*Delta	3,000.00	235.00	1	2	1
*Lansdowne	1,937.75	144.00	1	1	....
Lombardy	1,390.79	169.00	1	....	....
LENNOX AND ADDINGTON					
Addington	606.64	198.00	1	2	....
Denbigh	74.80	130.00	....	....	....
Ernesttown	284.25	131.00	1	....	....
*Lennox	1,588.00	299.00	2	4	1
LINCOLN					
*Clinton and Louth	1,637.65	258.00	....	1	1
Smithville	606.75	176.00	1	....	....
MANITOULIN					
Howland	87.05	119.00	....	....	....
Manitoulin Island (Indian)	15.50	100.00	....	....	....
Manitowaning	350.90	332.00	....	....	1
Providence Bay	116.10	202.00	....	1	1
MIDDLESEX					
Caradoc	249.00	204.00	....	1	1
Dorchester	882.40	147.00	....	1	....
London Township	....	464.00	2	2	1
Melbourne	864.46	361.00	....	2	....
Mosa and Ekfrid	1,078.00	378.00	1	2	....
Parkhill	335.62	107.00	....	....	....
*Strathroy	1,320.35	800.00	....	2	1
Thorndale	277.10	185.00	3	1	....
United Indian (Indian)	....	100.00	....	....	....
Western Fair Association	....	2,270.00	....	....	....
Westminster	....	78.00	3	1	....
MUSKOKA					
Morrison	95.00	179.00	1	....	....
North Muskoka	390.39	317.00	2	....	....
South Muskoka	1,089.85	465.00	1	....	....
Stisted	12.75	89.00	....	....	....
NIPISSING					
Bonfield	38.75	121.00	....	....	....
Sturgeon Falls	72.00	151.00	....	....	....
Verner	....	84.00	1	....	....

Name of Society	Gate Receipts	Leg. Grant	No. Field Crop Comp.	No. Jr. Clubs	No. Comm. Feat.
NORFOLK					
Charlotteville (Walsh Fair)	171.00	78.00	.....	.....	.....
Houghton	155.15	54.00	.....	1	.....
**Norfolk County	13,580.00	800.00	2	5	.....
North Walsingham	52.75	57.00	.....	1	.....
NORTHUMBERLAND					
Brighton	377.95	53.00	.....	1	.....
Percy Township	571.30	387.00	.....	.....	1
Roseneath	2,627.52	534.00	.....	2	.....
Seymour	1,117.80	324.00	.....	.....	1
Wooler	....	61.00	.....	.....	.....
ONTARIO					
Brock	497.40	137.00	.....	2	.....
*North Ontario	1,712.32	294.00	.....	2	1
Port Perry and Scugog	1,743.00	483.00	1	2	.....
Rama	19.00	56.00	.....	.....	.....
Scott	418.40	182.00	2	4	.....
**South Ontario	3,864.95	520.00	1	3	.....
OXFORD					
Drumbo	848.60	329.00	1	.....	1
*Ingersoll, N. and W. Oxford	1,285.97	343.00	1	1	.....
*North Norwich	558.50	186.00	.....	1	.....
Tavistock	599.20	570.00	1	.....	.....
*Tillsonburg and Dereham	3,945.85	485.00	1	1	.....
West Zorra and Embro	316.05	251.00	1	4	.....
**Woodstock	5,118.05	800.00	1	9	.....
PARRY SOUND					
Armour, Ryerson and Burks Falls	1,439.00	338.00	.....	1	.....
Machar	212.00	256.00	2	2	.....
Magnetawan	115.75	229.00	1	1	.....
McKellar	107.50	303.00	2	1	.....
McMurrich	43.75	180.00	1	.....	.....
Perry (Emsdale Fair)	130.50	164.00	.....	.....	.....
Powassan	417.20	501.00	.....	.....	.....
Rosseau	68.00	189.00	.....	1	.....
Strong	205.00	270.00	1	1	.....
Trout Creek	203.80	285.00	2	2	.....
United Township	82.85	245.00	2	2	.....
PEEL					
Albion and Bolton	433.20	106.00	1	1	.....
Caledon	389.93	283.00	.....	2	.....
Cooksville	....	269.00	.....	.....	1
*Peel	1,377.10	800.00	1	2	.....
Toronto Gore	60.25	188.00	.....	.....	.....
Toronto Township	601.50	244.00	.....	.....	.....
PERTH					
Elma	....	189.00	.....	.....	.....
Listowel	1,506.35	555.00	.....	5	1
Mitchell	1,023.25	334.00	3	3	.....

Name of Society	*Gate Receipts*	*Leg. Grant*	*No. Field Crop Comp.*	*No. Jr. Clubs*	*No. Comm. Feat.*
PERTH (*Continued*)					
Mornington	333.05	186.00	.....	2	1
South Perth	946.95	257.00	.....	1	
*Stratford	4,191.26	800.00	3	5	
PETERBOROUGH					
Apsley	105.30	65.00	.....	.....	
Dummer and Douro (Stock)	.....	400.00	.....	—	—
East Peterborough	1,030.00	281.00	.....		
Galway and Somerville	696.63	115.00	.....		
Lakefield	351.95	323.00	1	1	
Lakehurst	.....	370.00	.....	.....	
Peterborough	17,812.22	800.00	.....	.....	
PRESCOTT					
South Plantagenet	184.50	82.00	.....	.....	1
*Vankleek Hill	3,629.05	489.00	.....	1	
PRINCE EDWARD					
*Prince Edward	.....	326.00	.....		
Sophiasburg	.....	66.00	.....	.....	
RAINY RIVER					
Atwood	634.10	287.00	1	1	
*Rainy River Valley	1,244.97	548.00	.....	1	
RENFREW					
*Arnprior	3,646.10	449.00	.....	2	
Cobden	723.00	266.00	.....	1	
*North Renfrew	992.25	352.00		2	
**Renfrew	7,238.84	800.00	3	4	1
RUSSELL					
Clarence	471.80	93.00	.....		.....
Cumberland Township	600.00	337.50	.....	2	.....
Russell	2,240.44	147.00	.....	1	.....
SIMCOE					
*Barrie	2,398.07	279.00	4	5	1
Beeton	764.68	281.00	1	5	
Cookstown	.....	112.00	.....		.....
Flos Township	520.80	159.00		2	
Huronia	.....	122.30	.....	.....	
*Nottawasaga and Gt. Northern	3,555.00	658.00	1	3	.....
Orillia	.....	359.00	.....	.....	
Oro	1,157.62	537.00	2	4	
Tiny and Tay	1,977.00	432.00	2	3	
STORMONT					
Roxborough	1,009.05	236.00	1	1	1
Stormont	987.00	401.00	1	—	—
SUDBURY					
Chelmsford	.....	44.00	—	—	.....
Hanmer	.....	101.00	2		
Massey	92.50	146.00	1		
Warren	—	219.00	1	.....	

Name of Society	Gate Receipts	Leg. Grant	No. Field Crop Comp.	No. Jr. Clubs	No. Comm. Feat.
THUNDER BAY					
**Canadian Lakehead Ex.	23,172.10	800.00	2	3	......
Oliver	706.25	234.00	1	......	......
Upsala	....	76.00	......	......	......
Whitefish Valley	15.29	114.00	......	1	......
TIMISKAMING					
Charlton	83.50	157.00	2	1	......
Englehart	....	275.00	2	......	1
**New Liskeard	2,108.06	300.00	1	......	1
VICTORIA					
Emily (Stock)	....	240.00	......	......	......
Mariposa	135.40	156.00	......	1	......
**South Victoria	8,115.40	800.00	......	1	......
*Verulam	1,126.00	317.00	1	1	......
WATERLOO					
*Elmira and Woolwich	4,217.12	387.00	......	4	......
**South Waterloo	5,201.95	800.00	3	4	1
Wellesley and Easthope	318.00	354.00	......	3	......
*Wilmot	1,963.96	499.00	......	4	......
WELLAND					
**Welland	9,550.25	800.00	2	2	1
WELLINGTON					
Arthur	....	295.00	......	......	......
Clifford	219.79	165.00	......	......	......
Erin	4,929.80	800.00	2	9	1
Mount Forest	1,603.00	458.00	2	2	......
Palmerston	730.90	365.00	......	2	......
Peel, Maryboro and Drayton	....	105.00	......	......	......
Puslinch	168.70	199.00	......	2	......
Wellington County	1,406.00	555.00	1	4	......
West Wellington	432.60	190.00	......	1	......
WENTWORTH					
Ancaster	1,606.25	745.00	2	1	1
Binbrook	502.75	342.00	1	1	1
Flamboro and Waterdown	280.00	294.00	2	......	1
North Wentworth	4,559.20	800.00	1	4	......
YORK					
Aurora	919.26	350.00	......	......	......
**Canadian National Ex.	624,460.62	2,500.00	......	......	1
**Markham and East York	3,980.00	800.00	2	2	1
Richmond Hill	1,999.80	389.00	3	2	......
Schomberg	412.00	190.00	......	1	......
**Sutton	3,000.00	293.00	......	......	......
Woodbridge	5,836.00	719.00	1	1	......

*—2 pay days.

**—More than 2 pay days.

14th ANNUAL MEETING, WOMEN'S DIVISION, ONTARIO ASSOCIATION OF AGRICULTURAL SOCIETIES

MISS INA HODGINS, Carp
President

Officers—1950

Honorary President	Mrs. J. K. Kelly, Almonte
Past President	Mrs. F. H. Henderson, Napanee
President	Miss Ina Hodgins, Carp
1st Vice-President	Mrs. W. A. Hume, Campbellford
2nd Vice-President	Mrs. Norman Hyslop, Glanford Station
Secretary-Treasurer	Mrs. H. A. Dickenson, Mount Hope

District Representatives

District No.	1	Mrs. S. W. Rathwell, Navan
"	2	Mrs. Alex Drysdale, Perth, R.R. 1
"	3	Mrs. H. M. Coulter, Tweed
"	4	Mrs. W. J. Webster, Oakwood, R.R. 9
"	5	Miss Mary Sweeney, Caledon
"	6	Mrs. Gordon Cutler, 209 Maple Ave., Welland
"	7	Mrs. Allan Orr, Arthur, R.R. 3
"	8	Mrs. Rufus Kestle, Exeter
"	9	Mrs. Dave McPherson, Dutton
"	10	Mrs. Anna Koehler, Dundalk
"	11	Mrs. W. C. Huckle, Bracebridge

"	12	Mrs. Andrew Dryden, Providence Bay
"	13	Mrs. Bert Dixon, Warren
"	14	Mrs. Alex. Robinson, Cochrane
"	15	Mrs. J. H. Booth, 184 Rupert St., Port Arthur

Past Presidents

1936	Mrs. Ethel Brant Monture, Ohsweken
1937	Mrs. Ethel Brant Monture, Ohsweken
1938	Mrs. Ethel Brant Monture, Ohsweken
1939	Mrs. Ethel Brant Monture, Ohsweken
1940	Mrs. J. K. Kelly, Almonte
1941	Mrs. J. K. Kelly, Almonte
1942	Miss Lillian Rutherford, Bolton
1943	Mrs. W. E. Palmer, Wainfleet
1944	Mrs. W. H. Huckle, Bracebridge
1945	Mrs. O. W. Rolph, Orono
1946	Mrs. H. A. Dickenson, Mount Hope
1947	Mrs. William Beattie, Staples
1948	Mrs. Alex. McKinney, Jr., Brampton, R.R. 2
1949	Mrs. F. H. Henderson, Napanee

PRESIDENT'S ADDRESS

Mrs. F. H. Henderson, Napanee.

IT is a very great pleasure for me to welcome this large gathering which has assembled from every part of the province to our 14th annual meeting of the Women's Division of the Ontario Association of Agricultural Societies.

At the door, you will meet our hostesses, Mrs. Gordon Cutler and Mrs. George Summerville; as well, we wish you all to register at the desk in the corridor, where Mrs. William Beattie and Mrs. H. M. Coulter are in charge. These ladies are there to welcome you and give you every assistance possible.

At this time I would like to mention the passing of Mrs. Vanette M. Winder, one of Aylmer's best known women. She was a Provincial Representative for Elgin, Kent and Essex Counties of the Agricultural Societies of Ontario, and will be greatly missed at our annual conventions. You will recall her very fine address of last year on "Are You Ready For the Fair?"

It is our wish that you may find our meetings very interesting and that you may be able to take back to your District and Societies many helpful ideas and suggestions. We would like all the ladies to feel free to enter into the discussions; in this way we get the most out of the convention.

I visited a number of Fairs last fall and did some judging and found most of the Fairs very progressive, even much better than 1948—more exhibits, more junior work and handicrafts. However, I would like to see better sanitation at some of the Fairs.

The Junior work is very encouraging and much credit is due to our very fine staff of Agricultural Representatives and Home Economists.

Our aim is to build a better tomorrow by encouraging the young of today.

I would like to take this opportunity to thank the District Representatives for the splendid leadership given their districts. I also wish to thank Mr. Carroll and his staff for the courteous and efficient service rendered this organization at all times.

I will always cherish the memory of being your president this year and I hope that I have helped in some way.

The new year, which we have just entered, brings with it doubt and uncertainty as we look over world conditions. I am sure we all realize that we have a job to do to the utmost of our ability, and while doing so must give thanks to Almighty God for the great blessings that are ours in this beautiful province of Ontario.

SUMMARY OF DISTRICT REPRESENTATIVE'S REPORTS

Miss Ina Hodgins, Carp.

THE reports from the Districts were so satisfactory and full of information that it was a joy to read them, but a difficult task to condense them to do them justice. With few exceptions, 1949 was one of the best years ever experienced by our Societies, who evidently too had the whole-hearted support of the public, and this is important because Fairs are a community enterprise. Most Fairs are giving a prominent section to the Juniors, who are certainly taking full advantage and creating animated interest. At many Fairs the competitions and demonstrations by these up-and-coming young people are alone worth a visit to the Fair. At one Fair in Eastern Ontario, it was an inspiration to see the Junior section. I refer to Cobden, where the Juniors had four pages in the regular prize list, had their own headquarter's tent, and looked after the entire show themselves. Isn't this the way to build up confidence and self-reliance, and provide the best possible training for future Fair directors?

DISTRICT No. 1

Director, Mrs. S. W. Rothwell, Navan.

Twelve out of twenty Societies reported to the director, and each Fair must have had as its slogan "bigger and better", since all reports indicate the most successful Fairs yet held.

Richmond's exhibits were the best in years. The Junior exhibits overflowed the space allowed them. The sod has been turned over for a new community hall on the Fair grounds.

Metcalfe, with a grand total of 3,500 entries, half of which were displayed in the Women's Division, speaks for itself.

Chesterville inaugurated a Women's Division and had 83 exhibitors displaying their exhibits in tents.

Mountain had increased entries in domestic science, and exceptional skill was shown by young people in lathe work.

Maxville for the first time held their Fair in June and were almost rained out. Exhibits were good, those from 11 schools creating much interest.

Williamstown had a good fair. The Women's Institutes co-operate well there.

Vankleek Hill had unsettled weather. The new grandstand and wing to dining hall added to appearance of grounds.

Russell have no ladies' section but hope to have suitable accommodation for one in 1950.

Navan Fair was a decided success. This Fair has outgrown its baby clothes, and is now four years old, and the results achieved are in keeping with the interest and enthusiasm displayed by the whole community.

Cornwall has had no Fair since 1939, but have purchased grounds, and hope to hold a Fair in 1951.

Carp had a banner year in number of exhibits, new exhibitors and gate receipts. Weaving and leathercraft classes were added.

Central Canada Exhibition—Held at Ottawa, entertained over 300 Women's Institute members and their friends to a tea in their beautiful assembly hall. Electric fans were in motion in the women's section, adding much to the comfort of the visitors.

DISTRICT No. 2

Director, Miss Agnes Yuill, Middleville.

Almonte had an excellent Fair, with best hall exhibit in years, with keen competition in the apple products display. The Junior Farmer Clubs and the Girls' Home-making Clubs had wonderful displays which were really "tops". Commercial displays in honey were new.

Arnprior had a successful Fair despite wet weather. A new annex was built to take care of flowers, baking and fruit, and the entire space was filled.

Cobden Fair was successful from all standpoints. CHOV Radio Station at Pembroke interviewed directors in each section, and later these recorded interviews were broadcast. Fine displays were shown by Junior Farmers, school pupils and Women's Institutes.

Beachburg had a splendid showing in all sections, with keen competition in the Women's Division. The Junior and school children's exhibits, also the club work was exceptionally good.

Perth had a wonderful exhibit, ideal weather and record attendance. New entrance gates were noted.

Renfrew continues to grow and prosper. The exhibits were excellent in all departments. All baking was under glass. Canned fruit and jellies arranged on glass shelves in front of the mirrors were shown to good advantage. The W.I. department was as usual outstanding—one feature being a display of old china and glass. Three Institutes sponsored a rest room, with comfortable chairs, couch, etc., on the first floor of the main building.

Middleville, with ideal weather, a better than ever exhibit, and good attendance had a commendable Fair. Pupils from ten schools exhibited in their section.

McDonald's Corners report a good Fair, with excellent exhibits in ladies' section. A splendid display of apples were shown.

Maberly Fair had unfavourable weather, which spoiled attendance. Their hall exhibits were up to their usual good standard. Special mention must be made of their domestic science and dairy exhibits.

DISTRICT No. 3

Director, Mrs. H. M. Coulter, Tweed.

Belleville—the Class "B" Fair in this district was a gratifying success, with many new exhibitors in handicrafts. The flowers were gorgeous and well arranged, and children's section commendable.

Tweed had a good Fair from standpoint of exhibits, quality, attendance, and weather. Flowers very lovely and arranged beautifully. Improvements had been made to grounds.

Stirling had perfect weather, good attendance and excellent exhibits.

Campbellford had very successful Fair, with many exhibits in needlework and domestic science. A display of needle work and furniture made by our new citizens from Holland created much interest. A parade of school children, each school headed by a banner giving name and number of school was interesting.

Picton, with neat and well kept grounds, and clean, tidy buildings, held a very fine Fair with good exhibits.

Madoc, with good weather, had a successful Fair, with baking and children's work worthy of special mention.

Roseneath had good attendance, with excellent exhibits, well displayed.

DISTRICT No. 4

Director, Mrs. Ira Lowe, Ida.

In this District Mrs. Lowe reports the trend of the 1949 Fairs included more attention given to Junior work, exhibits of a higher standard, sanitation improved, and tidy grounds and buildings. Women's Institute exhibits are growing very popular and were the centre of attraction at many Fairs. The director suggests that a junior boy and girl be included on the board of directors of each Fair. They are the show people of tomorrow—give them an opportunity now.

DISTRICT No. 5

Director, Mrs. G. R. Somerville, Acton.

Exhibits at all Fairs of better quality and more apples shown by local exhibitors than ever before. At *Milton* Fair a parade of costumes 50 years old or over (a group of three costumes from any one organization in Halton County) headed by the Girls' Pipe Band was held and enthusiastically received. A demonstration in clay modelling proved an attraction.

At *Brampton* the Junior baking entries could not be surpassed at any Fair.

Georgetown had a good Fair and thought it worth while to open their hall on first evening of the Fair.

DISTRICT No. 6

Director, Mrs. Gordon Cutler, Welland.

Beamsville. Practically all needlework was new and of superior workmanship.

Smithville enlarged their hall, and it was filled to capacity. The Women's Institute parade was a pleasing feature.

Binbrook had many new exhibitors, with work of splendid quality.

Waterdown suffered the worst rain of the Fair season.

Rockton had a good gate—all classes filled with good quality exhibits.

Ancaster, with an excellent food display, showed an advance. The Junior Girls with a commentator put on a Fashion Show.

Caledonia received Class "B" rating, and made vast improvements to buildings and grounds. Excellent exhibits of baking, needlework, Junior work, flowers and fruit.

Welland did extensive work on manufacturing building, and painted the inside of the ladies' building white. Juniors are making rapid progress. They also sponsored a Fashion Show.

DISTRICT No. 7

Director, Mrs. Allan Orr, Arthur.

The Fairs in this district show definite improvement. Better sanitary conditions prevailed and more convenient rest rooms for women noticed. Advanced prize lists warmly commended. Women's Institute and children's work continue to grow steadily. The Director suggests weaving and clay modelling be introduced.

DISTRICT No. 8

Director, Mrs. R. W. Kestle, Exeter.

The interest shown in new Canadians and their work is the highlight of this district, and very noticeable was the opportunity provided for children, young people, and club exhibits.

Ilderton gave five prizes in children's work.

Strathroy—The handicraft exhibits were greatly admired. The Middlesex Junior Farmers and Junior Institutes are very active.

Melbourne had a new building, of which they are justly proud.

Listowel had an attractive display of hobbies.

Blyth—The new Canadians showed fine native needlework. The Women's Institutes exhibited for the first time.

Brooke and *Alvinston* have new cases for food exhibits, but lack space for their large number of exhibits.

Dorchester—Co-operation received from the W.I. is commendable.

Kirkton—Mention must be made of the attractive arrangement of their lovely flower display.

Exeter showed marked improvement in quality of exhibits, with much new work shown, and were congratulated on their school childrens' work, which was an exhibition in itself.

DISTRICT No. 9

Director, Mrs. D. McPherson, Dutton.

The Fairs in this district have completed a good year's work, but were handicapped by unfavourable weather. Junior, Women's Institute and floral exhibits have outgrown the space allotted them.

DISTRICT No. 10

Director, Mrs. Guthrie Reid, Teeswater.

Enthusiasm, backed up by energetic work, has accomplished much in this district. Handicrafts are receiving added attention. Junior work is being encouraged, and good results obtained. Pet shows are very popular. Some fine buildings, new arenas and community halls have been built on exhibition grounds. Glass cases for food exhibits are needed.

DISTRICT No. 11

Director, Mrs. G. E. Foote, Streetsville.

Despite unfavourable weather at approximately three-fourths of the Fairs, attendance was good.

Ashworth excelled in domestic science.

Severn Bridge, a comparatively new Fair with well organized committees, is growing and is conspicuous for good exhibits, interested exhibitors and patrons.

Bracebridge has developed into one of the largest and best Fairs in the district. A sports programme, public speaking and music are worthy of special mention.

Huntsville installed flush toilets and modern wash rooms, and hold an auction sale of domestic science and vegetables after the Fair.

South River Fair was a gratifying success. The directors and committees are very enthusiastic, with new ideas, which they put into effect with wonderful results.

Burks Falls had a large Fair with a new hall which housed their splendid exhibits. The Board is well organized and its endeavours are bringing worthwhile results.

Sundridge and *McKellar* had good Fairs with increased attendance.

Dunchurch, one of the smaller Fairs, is justly proud of their new kitchens and lavatories completed in 1949.

Sprucedale and *Emsdale* revise their prize lists directly after the Fair when the alterations to be made are fresh in the minds of those concerned.

Trout Creek—Here the attendance exceeded that of any previous year. Vegetables were in abundance and new needlework nicely arranged.

Powassan—one of the larger Fairs, with keen directors and workers, are to be congratulated on the splendid results attained. They had a well organized and attractive programme.

Rosseau had very bad weather but good attendance. A boys' potato club was organized with much interest, and prizes were presented to winners at a banquet.

DISTRICT No. 12

Director, Mrs. Andrew Dryden, Providence Bay.

The Fairs in this district are functioning well, and are well attended. Commercial features were new and brought out exhibits.

DISTRICT No. 13

No report received.

DISTRICT No. 14

No report received.

DISTRICT No. 15

Director, Mrs. J. H. Booth, Port Arthur.

All Fairs in this district have energetic directors, and their efforts are having marked effect.

Emo had splendid displays of needlework and vegetables and Junior work.

Dryden is remodelling and painting their buildings.

Kenora is working hard to finance a new hall.

Rainy River has new fences and gate, and their dairy exhibits were exceptional.

The *Lakehead Exhibition* is arranging a building for women's work only, with large cases with glass windows for needlework. Food classes are all under glass. The centre of the building will be used for demonstrations. In 1950 they will celebrate their 60th anniversary.

HOME ECONOMICS EDUCATION TODAY

DR. MARGARET S. MCCREADY, Director, Macdonald Institute, O.A.C., Guelph.

WITH the initiation of a four-year degree course (senior matriculation entrance) in home economics at Macdonald Institute even some women may ask why the former two-year courses and the one-year course were not sufficient training for women who only get married in any case! Well, it is a very creditable thing, it seems to me, that the Ontario Department of Agriculture has backed the new and broader education for women who will mostly seek their careers in matrimony, it is true, although they will undoubtedly apply themselves to some other professional work first.

Just as so-called higher education has been considered of value and importance for students in agriculture and for the farm community, so it is expected that the fuller study programme for women in this all-important sphere of home economics will reflect helpful changes in our Canadian homes and those gainful occupations in which our graduates will be functioning. Does not this modern confused world require more homemakers, dietitians, teachers and extension workers, etc., well prepared to understand people and their needs for a satisfying home and community life? We look forward to our graduates contributing greatly to these ends.

The one-year diploma course in home economics (entrance requirement only two years of high school) continues to be a valuable addition to a young woman's education. It cannot, in such a short period of time, be expected to provide as wide scope for the students' development into mature human beings as the longer university course.

We would appreciate your suggestions as to how Macdonald Institute might in the future, given larger facilities and staff, be helpful in offering shorter courses which would promote the type of community work in which you are interested. We have been greatly encouraged by the interest and tangible support of the Ontario Women's Institute and realize that they are counting on us to co-operate with them. Similarly, stimulation from the women's division of the Ontario Association of Agricultural Societies will be welcomed. We hope to have graduates who will work in schemes for co-operative improvement of Ontario communities, an ideal which is surely close to your hearts.

Come and see us (or write us) when you can!

JUNIORS AT FAIRS

JEAN SCOTT, Home Economist, Women's Institute Branch, Stratford.

AGRICULTURAL Societies, along with other senior organizations, have a part to play in promoting Junior activities in rural communities. Much of this is being done through Junior club work. If not actively sponsoring a club, Agricultural Societies frequently give recognition and encouragement to club members. This is important because it stimulates interest in the local club and gives the Juniors a needed incentive to do their best.

The general objective in club work is to develop rural young people and to train them to take a constructive part in community life and activity. Well planned club programmes build confidence in our young people; they develop a spirit of co-operation and the desire to work together for mutual benefit; they provide opportunities for training in leadership and in a general way prepare the members for effective service in the community. Learning to do by doing is a basic principle of club work and so participation on the part of the Juniors themselves is essential. There is no better place for them to begin than among their fellow club members in their own community. Have you a place for them at your Fair? If so, can you make it a broader and more stimulating programme in 1950? It will require thought and effort but it will pay dividends in the end.

The Juniors themselves have already told us something of the possibilities of special accommodation and new ideas. There are many ways to build up your Junior section, and since accommodation and circumstances vary so much throughout the province, there is no one method for all.

If you have a Homemaking Club in your community, the possibilities are varied. These clubs include girls and young women between the ages of 12 and 26 years and are directed by a local leader. Different projects are undertaken each year, so we would recommend that you consult the leaders when you are preparing your prize list. One suggestion is to have some individual classes for the club members. If the project is the Supper Club you might include a class of tea biscuits. The Club Girl Entertains suggests sandwiches for tea or a flower arrangement class. Cottons May Be Smart members would be glad to exhibit their cotton dresses, and so on down the line. If space permits, you might try club exhibits. This is especially good if your Fair includes several clubs. The girls prepare these special exhibits for their County Achievement Day and are usually glad of the opportunity to set them up once more. In this case, an award might be given to each club without making it a competitive feature of the Fair. This is a decided advantage in promoting a good attitude among the girls, and if the exhibits are well labelled with good posters they are a good publicity agent for club work.

One project which fits in well with the Fair is the Girls' Home Garden Club. You might give consideration to classes for vegetables and flowers grown in club gardens. Here again, club exhibits are popular and make a good display. In Perth County we hold our Garden Club Achievement Days in connection with Stratford, Listowel and Mitchell Fairs. In this instance, the plan seems to have been satisfactory. This may not always be the case as there are certain requirements necessary to the staging of a successful Achievement Day. The first essential is adequate space for the exhibits. Each girl is allotted so much table space and she plans her exhibit accordingly. Then there must be a place of meeting with seating accommodation for the girls in order that the usual programme may be carried out. For these reasons, County Achievement Days are becoming more popular. If these are held early in the season, it is quite possible to have the clubs set up club exhibits at local Fairs. This still gives the Juniors a place at the Fair and yet more opportunity for participation at their Achievement Day. Where suitable arrangements are made as at the Fairs mentioned, we have felt that the disadvantages of a

shorter meeting and less time for discussion are somewhat offset by the fact that some 80 Juniors have a definite place in these three Fairs.

It was mentioned earlier that senior organizations are giving recognition to Juniors who make an effort to take part in club work and community activities. In the Stratford and Listowel areas, it is the Rotary Club who, in co-operation with Agricultural Societies, entertain the club girls and boys at a luncheon or banquet. This is a highlight as far as the girls are concerned and it is a very happy ending to the season's work.

So far we have been thinking in terms of local clubs. Inter-club participation is always good, but there are even greater advantages in an inter-county programme. Here it is that Juniors see what other counties are doing; they gain ideas for the improvement of their own work; they unconsciously level off their own standard of work, and best of all, they have an opportunity to meet leaders and girls from other counties. Class "B" Fairs may sponsor such a programme because of the special grant available to them. Stratford Fair has been conducting this type of event for many years and it has become a well established part of Junior activities in that area. In a 30-foot space in the main building a Homemaking Club exhibit is on display for the three days of the Fair. This is comprised of exhibits selected at County Achievement Days. It usually includes exhibits of food, clothing and garden projects. The girls themselves plan and put up the exhibits and we are responsible for large signs and posters identifying the display as a whole. The last day of the Fair, a full day's programme is planned for the girls. The morning session is spent in individual work, including judging, giving reasons and various other activities connected with their work. In the afternoon the clubs put on demonstrations and skits based on the projects taken during the year. Prize money is distributed by the group basis of award. This has proven very satisfactory over a period of years. Up-to-date, we have been holding this programme in a tent on the Fair Grounds. Sometime we hope to better this. Good accommodation helps so much to make the day successful. Anything you can do to improve this for the Juniors at your Fair will be an incentive to better exhibits and a sounder educational programme. Posters identifying exhibits and showing the location of the Junior tent or building make the public conscious of Junior work and gives it full value at the Fair.

Junior activities are, of course, not confined to club work alone. Every community has at least a few teen-age girls. Make a place for them at your Fair by having a special section in the prize list. Select classes which are not too difficult and are suited to the girls. Then advertise this special feature thoroughly. Juniors often feel a sense of insecurity about exhibiting and need encouragement to enter.

Perhaps you have a Junior Farmer, Junior Institute, or other Junior organization in your community. They, too, have a place at the local Fair. These groups sometimes set up educational exhibits on a non-competitive basis. If there are several organizations in the territory covered, this makes a final addition to your display and at the same time gives the Juniors some experience. Last year Teeswater gave their Juniors a little different project. This was to stage a play as the entertainment for two nights of the Fair. The Juniors accepted the challenge

and did a fine job. This all helps to co-ordinate effort and make the Fair a true community undertaking.

It is a foregone conclusion that every Agricultural Society wishes to have a part in the development of their Juniors and to enlist their interest and support. As you go about your plans for 1950, take stock of your Juniors. What age groups have you in your community? What clubs or organizations are active this year? What projects are being undertaken? Then take a look at your 1949 prize list. What was there for the Juniors last year? Was there good participation? Did it develop your young people as well as help the Fair? Could you have a more extensive programme in the coming year? Have you facilities to handle it? If your Junior section is based on the needs and interests of your own Juniors, on sound objectives and a careful appraisal of past experience and present facilities, it will be worthy of a place in your Fair. It must, of course, be put into action. Do you have a live Junior committee selected from your directors? You need some one to contact the Juniors who can arouse their interest, get their co-operation, and who is prepared to work hand in hand with them.

FASHION SHOW AT ANCASTER AND OTHER JUNIOR FAIR ACTIVITIES

MARY WOODLEY, Alberton.

FASHION SHOW

This project started in 1948.

Requirements: Daytime dress to be made and modelled by the exhibitor.

Dresses were entered first day of Fair and judged for workmanship, with maximum of 50 points.

Dresses were modelled in evening by the contestants and judged on the following basis:

	Points
Modelling	20
Suitability of material to wearer	15
Suitability of style to wearer	15
Total	50

Each girl was given $5.00. Special prizes were also awarded for highest in workmanship, modelling, suitability of material to wearer, suitability of style to wearer. Highest in final total got Du Barry beauty kit.

On second day of Fair dresses were modelled in front of grandstand and commentator told what each girl was wearing and the winners of the prizes. Each girl was given a corsage by a local florist.

OPEN CLASSES FOR JUNIORS

In Wentworth County we have four Fairs and the prize list is the same at each.

Junior Farmers have a bi-annual bus trip to Ottawa and Montreal. The highest in points at each Fair is given $25.00 towards trip by different organizations.

1st prize	4 points
2nd prize	3 points
3rd prize	2 points
4th prize	1 point

Our Junior Farmers have a slogan, "Each member will make three entries in Junior Farmers' department".

MORE ABOUT HANDICRAFTS

JOHN F. CLARK, Ontario Department of Agriculture, Toronto.

IN connection with handicrafts it seems there are three things which should concern us most. First, the making of all types of articles that come within this category. Second, displaying these in order to further interest in the crafts. Third, how and where can we dispose of surplus articles.

The widespread interest in all types of handicraft justifies continued activity along this line. There are many things which contribute to this interest.

AGENCIES AT WORK

The great influx of people from European countries has stimulated interest. These new citizens in many instances have grown up making things similar to what their fathers made for centuries, consequently they do metal, leather, wood and many types of fancy work quite naturally. Their knowledge of pottery, art and weaving has been part of their education. They have brought this knowledge and interest into Canada, the result being examples of fine work all over Ontario. In many cases these people are willing to instruct others who are anxious to learn.

Vocational schools and manual training classes are also doing much towards fostering the crafts. Our children in elementary schools, both urban and rural, are turning out exceptionally good work in both quality and quantity.

Guilds and interested groups are springing up in our towns and cities, where office girls and others meet to receive instruction in craft work. It is quite the accepted thing to participate in handicraft work as a hobby and means of extra revenue.

The fact that these agencies are at work means there is a large quantity of material available for display, and yet the amount exhibited is comparatively small. The question arises as to how we can get such items out of hiding. The Fall Fair definitely plays a part, in that it presents an opportunity of displaying exhibits of such work. It remains for each community to decide whether such exhibits should be competitive or non-competitive, and the latter will often produce the best results.

WHAT SHALL WE MAKE

Two points are worthy of consideration in making articles for display and sale. Sale, because we usually make more than one of a kind.

The first is utility value. People very often make things because they can use them, rather than because they are ornamental. In this group will be found fabrics made by weaving, wearing apparel of many kinds, rugs, quilts, knitted goods, and furniture. This holds true in countries where people made things simple because they could not buy them. Such things have a strong appeal because they are hand made, usually lasting longer than a quickly manufactured article.

Secondly, make things that have an appeal to the tourist, or as gifts among our own citizens. This class would include anything made of wood, metal and leather, where usefulness and utility values may be combined. Such articles are legion, but it would seem that if the article were typical of the province it would carry a strong appeal. Wooden articles, either carved or constructed, are a part of our woodlot or forest, consequently the tourist carries away a part of the country visited, with little chance of breakages.

The thing of prime importance is good material, coupled with good workmanship. Never waste good material with faulty craftsmanship. Every one admires what is commonly called "finish". This would include design, clean cuts, tight joints, smooth surfaces, lacquer or enamel coverings, all of which appeal to the eye.

DISPLAYING HANDICRAFT WORK

The Fall Fair is a good medium as it brings visitors from the surrounding countryside. The local bazaar also offers opportunity for display. Unfortunately many buildings are not suitable, as they do not provide an attractive setting for the fine arts. We can hardly expect good things to be exhibited where there is dirt, dust or a roof that leaks. Provision should be made to prevent visitors from unnecessarily handling items that can be broken or soiled.

Prize lists should be arranged in such a manner as to bring out articles known to be in the district. Tables might be covered with white paper, with a background of cedar or spruce to relieve the dull wall. Have lights strong enough to review a display at night.

Appoint an intelligent committee composed of those interested in handicrafts, such as the manual training teacher, and start work early in the year for good results in autumn or later summer.

HOW AND WHERE TO DISPOSE OF MATERIAL

The average craftsman makes more than one article of a kind, which means a surplus. There is a sentimental value to the first that is made, and such is usually retained. But we try a second time, resulting in a better article. The design is slightly changed, and so stock piles up for disposal.

Gift shops in towns and cities purchase a great deal if articles are useful and well made. Some tourist homes sell small quantities to overnight guests. Summer

hotels and lodges are a ready means of disposal, and these are located in many parts of Ontario.

Goods may be placed on consignment in some cases, where they are sold on a commission basis. In other cases they are bought outright at a reasonable figure, permitting resale at a fair profit.

Where only a few extra articles are made, sale among friends is possibly the best means of disposal, as the personal touch enters into the transaction, one realizing that part of another's life has gone into the making of the article.

HELPS

Visit the library and examine a book on the particular line you wish to follow. In most libraries there is a shelf on handicrafts. If same is not there, suggest they be provided.

Subscribe to some magazine that features work of this nature, such as Popular Mechanics. There is also a small booklet issued once a month by the Atlantic and Pacific Stores, sold at 5c per copy. These usually appear the last Thursday of each month and are sold out by Saturday noon.

Join a group studying or working handicrafts. If such does not exist in your community, organize a small group and start in a modest manner, and very shortly the interest will grow and the accommodation may have to be increased. Invite speakers from outside points to address such groups and give demonstrations. Have a small display from time to time, either competitive or otherwise, and permit those exhibiting to dispose of their articles.

CLASS "B" FAIRS

J. E. Nephew, Woodstock
President

Officers—1950

Past President	R. Brodie Ness, Kingston, R.R. 7
President	J. E. Nephew, Woodstock
1st Vice-President	F. H. Bell, Stratford
2nd Vice-President	E. S. Denyes, Belleville
Secretary-Treasurer	H. I. Pond, Simcoe
Auditor	Lloyd Culver, Simcoe
Directors	Gordon Brown, Welland
	Wilfred Walker, Fort William
	J. F. Burwell, Renfrew

PRESIDENT'S ADDRESS

R. Brodie Ness, R.R. 7, Kingston.

ANOTHER year has rolled around, and I deem it an honour and privilege to have been your President. Although my duties have not been very strenuous, I feel that this organization is doing a good job in promoting the interests of our larger Fairs in this province.

Just a year ago we held a two-day session; the first day being open to Fair managers and secretaries to introduce proposed projects and discuss past experiences. That must have been a benefit to the Societies which they represented. I

feel that the good of that meeting will indeed assist me in active discussion on some of the various matters to be brought before this meeting today.

We are now in the last lap of the twentieth century. With all the progress that has been made since Fairs and Exhibitions were first started, I would like to feel that all agricultural activities will progress as much in the next ten years as they have in the past one hundred and twenty-five.

My recollection of the Class "B" organization dates back to about 1932, when the Societies or Fair Boards were receiving Federal assistance. The Department of Agriculture at that time felt it necessary to allocate their grants according to the actual prize money and the direct value of Fairs to the communities. A division was made between "A" and "B" Fairs. The "B" Fair organization was originally started with a small number and has now reached approximately thirty, leaving just our major large Fairs in Class "A" group.

A note of interest might be added at this time: Kingston was one of the four permanent locations under the name of Provincial Exhibitions, dating back to 1875. This Society, along with a number of others, has passed the 100th year mark, and has been suitably recognized by assistance from the Provincial Government in the way of centennial memorial.

During the past Fall I attended most of the larger Fairs and a few Class "B" Fairs. I found that the attendance and exhibits were up to or above average, due, I think, to the organizing of Red and White and Black and White shows held in connection with local County Fairs. Exhibits and attendance at our larger Fairs in my opinion have decreased somewhat compared to those held previous to the war. This is due to the fact that under present conditions livestock is being held too long, while the prize money does not compensate the exhibitors for their time and expense involved.

I would like, on behalf of this organization, and I feel I can include all Societies, to express our sincere thanks for the willing, helpful and financial assistance that we receive from the Federal and Provincial Departments of Agriculture.

In winding up my rambling remarks, I wish to particularly thank Mr. J. A Carroll and his staff for the courteous and efficient service rendered this organization. I also thank you for the honour of acting as your President for the past year. My happy memories since being a member of this organization, with the friendship and acquaintances formed, will always be treasured.

HOW FAIRS AND EXHIBITIONS MAY CO-OPERATE IN CLUB WORK

JAMES D. MOORE, Canadian Council on Boys' and Girls' Club Work, Ottawa.

ON this occasion it is a pleasure to represent and to bring greetings from the Canadian Council on Boys' and Girls' Club Work. My work with the Council provides many opportunities of meeting with Agricultural Societies in the various provinces, especially when recognition is given to Junior Farm Club work. In each

province club programmes, for farm young people between the ages of twelve and twenty-one, receive support and assistance from many sources. Speaking from my associations with club work in Ontario, it is my impression that no other organization has shown greater interest in this movement than the Agricultural Societies and, for this reason, I am grateful for the privilege of extending to you, and to the Societies that you represent, sincere congratulations for your important contribution. Because you have given of your time and effort to recognize young people, hundreds of farm youth today are receiving encouragement and incentive to achieve worthwhile objectives, not only in their club programmes but also endeavours in which they are planning for the future. This thought in mind I hope to discuss with you today ways in which Agricultural Societies might co-operate in promoting Junior Farm Club work.

If our interpretation is correct we would say that the purpose of an Agricultural Society is not only to organize and to conduct an annual exhibition but also to give leadership and assistance to the surrounding community. If such is true, then experience has proven that one of the most effective and constructive ways of achieving such an objective is through providing leadership to club work. Many examples could be cited to prove that club work is today the best training ground for future leaders in agriculture and homemaking. Agricultural Societies that have, over a period of years, given leadership and prominence to Junior work will readily agree with this claim. A large percentage of the Societies represented here today are no doubt giving generous assistance but, to any that are not, we would strongly recommend that you give serious consideration to supporting Junior Club projects in your community and to enlarging the Junior section of your exhibition.

In order that an Agricultural Society might qualify for the grant for Junior work, as provided by the Dominion Department of Agriculture, we understand that it must have a special committee to direct the Junior section of the exhibition. Could the contribution and influence of this committee be extended to permit its members to serve as leaders of Junior Club projects? Such persons, working in co-operation with the District Home Economist and the County Agricultural Representative or his assistant, could visit prospective club members, explain to them the advantages of membership in a Junior Club, determine what type of Junior project would be the most suitable in the community and from there proceed to organize clubs with the Agricultural Society as the sponsoring organization. Before continuing with this suggestion it should be stressed that the best time to embark on such a campaign is shortly after your exhibition closes. In too many cases Junior Farm Clubs are organized in April and May and conclude with the achievement day at the Fall Fair. It has been our observation across Canada that many of the most progressive and successful Junior clubs are those that are organized, and function in the community, for twelve months of the year. The meetings in the winter months allow for a review of the previous year's work, for reorganization, for planning in advance for programmes for each meeting, for securing new members and for educational meetings such as studies of club literature and instruction in public speaking and parliamentary procedure. The summer meetings serve more for outside activity, such as trips to prominent farms and

agricultural institutions, instruction in judging, athletics, and a special time set aside for instruction to the club members on how to prepare their exhibits and how to display them at the Fair.

But, before any attempt is made to organize junior clubs you should ascertain how many of the directors of your Society, or other persons in the community, are prepared to give the necessary leadership. If properly organized and given good leadership, junior clubs can be a real asset to the community and to the sponsoring organization. There are in this province hundreds of farmers, housewives, members of county junior farmer associations and others, that are qualified to provide exceptional leadership to club work. It is not my intention to discuss at this time how these potential leaders can assist, because, under the direction of the Ontario Department of Agriculture, leader training schools are conducted periodically for the purpose of assisting local leaders. We would suggest that you encourage and assist those in your community that are interested in club work, to attend these leader training schools. Through your efforts to develop a plan of local leadership and from carrying on a twelve months' club programme, your Society, through its junior committee, could render an exceptional and far-reaching service. In addition, you would be developing not only future exhibitors and executive members, but also the co-operation of the club members' parents and of the community as a whole.

Perhaps the most significant day of the year for the junior club member is Achievement Day. For this reason we like to see it as a part of the programme at the local Fair. Many of the Agricultural Societies co-operate by providing special accommodation and by featuring the exhibits brought to the Fair by the juniors. Some of the exhibitions that we have attended have erected in recent years separate buildings for the juniors. Such is the case at Pictou and Truro in Nova Scotia, and at Sherbrooke in Quebec. At Prince Albert in Saskatchewan, and at Simcoe in Ontario buildings that were used at Army Training Centres have been converted to serve as junior headquarters. These buildings have proven a real asset to the grounds and at the same time they have inspired the juniors to improve the quality of their exhibits and to increase their interest in the Fair. Unfortunately the cost of constructing such a building is a factor at the present time; however, there are many other ways in which accommodation can be provided for the club exhibits. Using a calf club as an example, we would suggest that a prominent section be reserved in one of the buildings for the club calves, and that a suitable sign indicating the name of the club be placed above the exhibit. This sign should be constructed so that it can be used to lead the club parade or at other functions during the year. Similar accommodation could be reserved in other buildings for exhibits from the clothing, food, garden, potato, grain and other clubs. We would recommend also that on Fair day, uniform blankets be provided for club calves and that all juniors attending the Fair wear uniforms or sweaters that are distinctive of club work in the district and in the province. This latter suggestion might be a special project for the club members themselves to adopt and finance during the year.

Further recognition can be given to the club members during Fair day by having them exhibit their livestock in the regular show ring when a large crowd

is present. These juniors are proud of their animals and they merit the attention of a large ringside to the same extent as the senior exhibitors. The judge should be asked to give reasons to the club members for his placing of each junior class. Also, we like to see the club members with their club leaders on parade, and as they pass the grandstand the chairman of the Societies Junior Committee should announce over the public address system the names of the members and of their leaders.

When speaking of club members being on parade we recall attending a summer Fair in Manitoba last year when eighteen agricultural and homemaking clubs competed for a special prize for the best club in the parade. This parade, which was headed by the community band, started at the far end of the town and concluded in front of the grandstand. The clubs were scored on such things as their marching ability, their uniforms and their club banner. At the same Fair there were classes in the buildings for junior club displays. Twenty-eight clubs competed and featured such things as the home garden, soil conservation, food preparation, permanent pastures, being well dressed and well groomed, pest and insect control, the farm workshop and others. We assisted in judging the junior club parade and the displays, and we can assure you that both were highlights of the day's programme.

An inter-club demonstration competition for the junior section of your Fair is worthy of consideration. The leaders of girls' club work have made great progress in developing this type of junior activity, and at each of their achievement days the highlight of the programme is the period set aside for team demonstrations. Speaking from personal experience, on the subject of team demonstrations, one of the most profitable experiences I had during the five years I was enrolled in junior club work, was preparing and taking part in a fifteen-minute team demonstration at the Peterborough Exhibition in the fall of 1938. Six junior clubs competed and each team consisted of two members from the same club. Our demonstration was "How to fit and show a dairy calf". Others in the competition demonstrated treating seed grain, mixing a laying mash, disinfecting seed potatoes, making a calf blanket and the construction of a range hopper for chickens.

Many of the Agricultural Societies in Ontario have as guests at their annual banquets the members of junior clubs which they sponsored during the year. We heartily approve of this procedure although, as junior farm club work expands, consideration should be given to providing a separate banquet and social evening for all the members of the homemaking and agricultural clubs of the community. Make this a night distinctly for the juniors, for the club leaders and for the presentation of prizes. It could serve also as an occasion to honour the parents because parent interest is of prime importance in junior club work. We should encourage greater member participation in our entire programme of junior work because this is the most effective way to discover new talent and to maintain the interest of each member. A banquet as suggested would provide ample opportunities for the members to take part in a programme of this kind, and thereby to gain valuable training in the art of self-expression.

This special junior banquet could be held early in December and be organized by the Junior Committee of the Society in co-operation with the club leaders. Assistance for financing the same could be secured from such organizations as the Agricultural Society, the County Federation of Agriculture, the Women's Institutes and the Agricultural Committee of the County Council. Such an evening would provide a splendid opportunity to pay tribute to the work of these junior clubs in the community. Further, it would serve as a fitting climax to the year's work, and it would create an abundance of enthusiasm to proceed with the programme of junior work for the coming year.

While it is our impression that large cash prizes are sometimes detrimental to junior club work, we do feel that there should be recognition for success and achievement. The best example we have encountered in Canada is the method used in several counties of Ontario whereby one piece of silverware is awarded to each junior homemaking club member on completion of each project. The girls are allowed to choose the pattern they are collecting, with the result that over a period of years they are able to acquire a useful and permanent reward for their efforts in club work. This type of award should be encourage because it furnishes an incentive for youth to continue as club members and to excell in their work. And, in this connection we would recommend that useful prizes be awarded for such things as the best attendance and interest throughout the year, for being on time at the regular club meetings, for keeping the best set of records, and a prize to the member who brings out the most new members during the year. A prize is awarded each year in the cattle section of the Royal Winter Fair to the exhibitor who presents the neatest and most attractive display. Needless to say the competition is keen and it results in well-kept stables at all times. When you have sufficient junior clubs exhibiting at your Fair this type of an award would be worth considering, and, when scoring such a competition, points should be given to the clubs that have the highest percentage of their regular membership exhibiting at the Fair.

Finally, we would emphasize again that you give greater recognition to those who are serving as club leaders regardless of whether they are associated with clubs that are sponsored by your Society. Among other forms of recognition for leadership, certificates may be presented to those who have given at least five years of leadership to club work. These are awarded by the Canadian Council on Boys and Girls' Club Work, Ottawa. Also, each local leader should be a director of your Society and automatically be a member of your Junior Committee. When speaking a recognition to local leaders we would like to compliment the Ontario Department of Agriculture for the two-day trip to the Royal Winter Fair which they awarded in 1949 to 325 club leaders in the province. This is the type of award that is appreciated by local leaders, and it should be encouraged on a local basis as much as possible. Local leaders, who give voluntary service, play a vital part in junior farm club work in Canada and they are deserving of the highest possible honour. What we need today is more qualified leaders, and in no field is the need so great as in the training of our youth. There were over 50,000 juniors enrolled in club work in Canada last year, 11,500 of which were in Ontario. In the light

of statistics, however, we are forced to admit that there is a great field yet untouched.

The importance of the training of our farm youth cannot be over-emphasized. Just as much thought and attention should be given to their development as to the improving of our farming practices in general. We are certain that you will experience a great deal of satisfaction from assistance given to junior work and that at the same time you will be building bigger and better Agricultural Societies in the province of Ontario.

PROGRAMMING YOUR FAIR

F. Q. Dench, Renfrew.

I DO not pretend to be able to advise everyone as to just how they should draw up a programme for their Fair and I am therefore using the heading "Programming Our Fair" rather than the one assigned to me. I would therefore ask you to pardon me for making comment with reference to Renfrew Fair, but I am using it as an example as to the plan in setting up a Fair programme which has worked out quite satisfactorily.

I should first explain our general set up. Each of our directors acts as a chairman of a particular committee. Each director is allowed to select his own committee members. He is responsible to the Management Committee and to the rest of the directors for the success of their particular division of the Fair.

In order to draw up the main programme, which includes races, parades, light and heavy horse show, tractor rodeo, etc., the committee members involved get together immediately before the Fair and drew up a joint programme which is printed and placed around the grounds on various buildings. A paper copy is handed to each livestock exhibitor.

Included on the printed programme is the time of judging each class, the time of the parades, etc.

Committees endeavour to draw up a balanced programme for the three days. They attempt to judge some of the large and better classes at a time during the day when the crowd is likely to be at its peak. Young stock on halter are usually judged during the morning or in the late afternoon.

We have three breed shows, namely, Hereford, Holstein and Shorthorn. These begin during the morning at 10 o'clock sharp. Most people are interested in the individual classes, so that most of these are run off in the morning or early afternoon before races and other grandstand programmes get under way. We have found that by providing bleachers at the livestock judging ring, we have more than doubled the number of spectators watching the breed shows. These bleachers are portable and can be put into the barns during the winter months.

A special loud speaker system at the livestock judging ring, over which winners are announced, adds much to the breed shows. A special catalogue of entries is also prepared for each breed show and given out to those attending the show.

In drawing up our programme for exhibition in front of the grandstand, an effort is made to make full use of the track and judging ring. Harness classes are held on the track between races. Heavy horse judging and saddle classes usually take place on the ring in front of the grandstand.

Every effort is made to keep exactly on schedule. A two-way speaker system proves quite helpful. One speaker announces the class, winners, etc., to the grandstand, while the second speaker announces the class and the programme to the exhibitors at the barns. There are a few ideas which are followed which might be of interest:

1. Classes for team hitched are usually staged immediately before the parade or immediately after. Most exhibitors like to have their teams hitched for the parade.
2. Every effort is made to stagger classes where exhibitors might be using the same equipment.
3. It is not wise to have classes for teams and singles too close together on the programme.

Definite times can be allotted for the judging of each class provided that all entries are received on a specific date in advance, and that no additional entries are accepted by the secretary at a later date. From our experience, however, we have found that it is better to allot the time for the judging of each class on the basis of previous experience and on the number of entries likely to be received in each class. In the case of Renfrew, all entries are to be in not later than Saturday night previous to the Fair. Usually on Sunday a joint committee meeting is held and the programme is drawn up on the basis of the entries on file. Various spaces of time are allowed, depending on the number of entries in each class.

It is also important to have the judge keep pretty well on time. If the judge is too slow the programme drags on and probably some of the better classes which are planned for the middle of the afternoon may not be judged until after a good portion of the crowd has left the stand. We have found the judges very co-operative and they usually keep the programme running on time or very close to it. It is also important not to have the classes judged ahead of schedule, as some exhibitors might be left out.

In case of rain for any length of time during the afternoon, the programme is usually postponed until the following morning.

In connection with the livestock parades, if they are to be a success from year to year they must be run almost exactly on the scheduled time. If cattle exhibitors are required to stand around for half or three-quarters of an hour it is pretty difficult to get them out the following afternoon or even at next season's Fair.

Definite programmes are also drawn up for the schedule of all junior events, including calf club shows, tractor rodeo and various other livestock and seed judging competitions, etc.

As mentioned previously, printed programmes are available on the first day of the Fair and handed to each exhibitor and are posted around the barns. The

general programme includes the times for feature events and are well advertised through the press and radio.

This programme gives the time and place of each event scheduled for the Fair.

COMMERCIAL EXHIBITS AT FAIRS

EDGAR HEWITT, R.R. 3, Simcoe, Ont.

THE subject of commercial production exhibits at Agricultural Fairs is one that has held my interest for a number of years, and I have much satisfaction today in seeing that they are being developed on an ever-increasing scale.

Previous to coming to Canada I was not a farmer, but I had many connections with Fairs, both industrial and agricultural. I attended rural Fairs, mainly to spend a pleasant day, to meet with friends and to observe and learn, by competition in agricultural products and livestock, the perfection obtained.

I attended industrial Fairs sometimes as an interested visitor and on other occasions as a buyer or exhibitor. As a buyer my visits enabled me to make actual comparisons and to check one product with another. As an exhibitor, I was able to make direct contact with the potential buyer, display what we had to sell and demonstrate its qualities. I found this promoted interest in the product.

After farming in Canada for a while I began specializing in potato growing. As our district was not considered an ideal potato area, there are many who doubted my chances of success. The venture did prove successful, but selling the crop provided other problems. Advertising brought some results, but as Fair time approached I viewed the possibility of displaying potatoes, not in the usual competitive classes, but in a commercial manner as a local product, and to prove their equal or excellence over imported potatoes; also to educate the public in the various grades, qualities and uses, for at that time much undergrade local produce was sold as No. 1 and very much to the detriment of the farmer who relied on the sale of potatoes for his living. It was also intended to show the public, or potential buyers, a good local product and where and from whom it could be obtained.

I was not at that time connected with our local Fair Board, and I had a job convincing them that such a display was in the interest of the public; that it could be an asset to the Fair and a great help to the farmer; that the promotion and sale of the farm products of the county was one of the prime purposes of the Fair, and that such displays should be allowed without payment of a concession fee.

Well, I won my argument, set up my display in the vegetable section and filled up some space that would otherwise have been empty. The director liked that and it did create much interest among the Fair patrons. I carried this project on for two years, and as a result I have had a good local market for all the potatoes I could produce, and it wasn't long until enquiries began to come from outside the county.

Knowing what the potato display had done for me, I attempted to get our Fair Board interested in developing this type of commercial display and to make

the Fair a show window for the commercial producers of agricultural products in the county. The main exhibit buildings of the Fair had always been used for displays aimed at encouraging sales of farm machinery and domestic appliances, so my thought was "Why could we not do the same for farm products".

I was more than pleased when the Department of Agriculture offered grants to encourage a similar type of exhibit and, of course, when the plan was adopted by Norfolk Fair we chose potatoes. We took the lowly spud, dressed it up, put it on a pedestal and made a worthy display of it.

The work connected with building up this class was considerable. As you are aware, the labour situation on farms has been very difficult in recent years, and farmers were reluctant to take time off to prepare and exhibit on such a scale, and anyway marketing problems were not too acute just then. Our Agricultural Representative helped to persuade a few of our principal growers to make a display of potatoes showing quality, grades, crop rotations, cultural practices, uses of the vegetable, etc. When we considered we were only working with one product the results were very satisfying indeed. We had a good show from the standpoint of public interest, as well as educational and sales promotion. All but one exhibitor came back the next year with an even better show, and new exhibitors were added to the list.

Good prizes were offered and we gave exhibitors assistance by providing professionally made display panels and cards, which put the finishing touches to the display. Without these signs or home-made ones, the display would not have looked so good.

One grower who entered the class for the first time last year, and not having any markets in mind when he planted his crop, and wondering where he would sell them, is now completely sold out.

Commercial classes, in my opinion, are the greatest advancement in produce displays at our rural Fairs. When developed properly they will provide educational value, both to consumers and producers. They can suggest and demonstrate better and wider use of a product and also improved production and marketing practices. They could be developed to the point where the trade could be encouraged to meet the producer to the mutual advantage of both.

Commercial displays are the only true manner in which any product in commercial quantity and properly packaged can be presented to potential buyers. The time has passed when agricultural Fairs are used primarily to promote friendly competition between farmers, often with produce not of his own growing or just with a garden sample, or to provide an interesting day or so for the curious public. Their primary interest and purpose is to promote good agricultural practices for quantity production of quality produce, and to demonstrate the best production and marketing practices. This can best be done by true commercial exhibit classes, thus presenting to the public a product in its natural and usual saleable form.

Industry has successfully used these methods for years. Agricultural Fairs are a much older institution than their industrial counterpart. I cannot understand why agriculture has lagged so far behind in this respect.

The very state of the markets for our farm products makes it imperative that we improve the quality and widen the use of, and increase the sale of our produce. I firmly believe that commercial exhibits at our Fairs provide this opportunity.

DOMINION GOVERNMENT ASSISTANCE TO CLASS "A" AND "B" FAIRS

Wm. S. McMullen, Dominion Department of Agriculture, Toronto.

At the request of Mr. E. F. Pineau, Associate Chief, Production Service, Ottawa, whose name was listed on your programme to deliver an address on this occasion, I wish to express his regrets for not being in a position to attend. He also asked me to extend to you his best wishes for a satisfactory convention and success in your activities throughout the year.

It is with pleasure that I have accepted the invitation to deputize for Mr. Pineau. I consider it a privilege to meet again with the directors and representatives of the Ontario Association of Class "B" Fairs and Exhibitions. I have valued my associations during the past four years with quite a goodly number of this audience in the administration of the Dominion Fairs policy, at which time work has been undertaken pertaining to inspection of accounts and permanent improvements and repairs to Fair Grounds property, also in connection with the grant featuring Boys' and Girls' Club work and Junior Farmers' activities.

With some Agricultural Societies having been recently raised to Class "B" rating or contemplating application, and with change in officers from time to time, I have been asked to speak of the assistance provided by the Dominion Department of Agriculture to Class "A" and Class "B" Fairs and Exhibitions.

At the present time, in the province of Ontario, there are seven Fairs and Exhibitions recognized as Class "A" and nineteen of Class "B" status.

In order to qualify for recognition in Class "B", a Fair, which had not in the past had such recognition, must be recommended by the Provincial Department of Agriculture and must be able to show that in the three years prior to the year in which its application is made, the prize money annually distributed by it in utility classes averaged not less than $3,000.00.

To graduate from a Class "B" to a Class "A" Fair, it was agreed that an exhibition must be recommended by the Provincial Department of Agriculture and must be able to show that in the three years prior to the year in which its application is made, the prize money annually distributed by it in utility classes averaged not less than $6,000.00.

It is understood that the basis of assessing the prize money annually distributed shall be for the "utility" classes of livestock, poultry, grain, vegetables, fruits, dairy products and honey.

During the month of November, 1945, an agreement was arrived at between representatives of the Department and the Canadian Association of Exhibitions that, in future, financial assistance provided by the Dominion Department of

Agriculture to Class "A" and Class "B" Fairs should take the form of a contribution towards the improvement of their permanent buildings, property and equipment rather than, as in the past, to supplement the prize money offered.

Limit of Financial Assistance Under the Dominion Fairs Policy to an Association in Any One Year

Class "A" Exhibitions—

Permanent improvements	Up to	$3,000.00	
Towards cost of securing judges		500.00	
Support of junior activities	Up to	500.00	
			$4,000.00

Class "B" Fairs—

Permanent improvements	Up to	$1,800.00	
Towards cost of securing judges		200.00	
Support of junior activities	Up to	500.00	
			$2,500.00

Permanent improvements and repairs towards the cost of which the Department will be prepared to contribute are defined as follows:

1. Building or installation of facilities for the better display of agricultural products.
2. Building or installation of facilities for the accommodation of club members or livestock attendants.
3. Major repairs or alternations to buildings.
4. Movement of buildings to more desirable location on the Fair Grounds.
5. Major improvements of Fair Grounds.

In order to be assured of financial assistance towards expenditures on improvements and repairs to property, the Agricultural Society concerned is required to submit a proposal and estimate in sufficient time to permit agreement prior to commencement of said improvement and repairs.

Acceptance of application will, among other things, be conditional upon at least one-half the cost of the undertaking being borne by the Agricultural Society. In the event of the cost of permanent improvements and repairs being in excess of the amount for which financial assistance is available in any one year, the Department is prepared to give consideration to entering into a long-term agreement whereby the undertaking and expenditure may be completed, this agreement to be then available as collateral, if so desired, to obtain loan with the understanding that the assistance from the Department will be forthcoming on a yearly basis until completion of payment. Long-term payment is made on a sum in excess of the estimated cost only by arrangement for agreement covering the additional expenditure. The maximum period of long-term agreement is ten years.

Towards the cost of providing satisfactory judges, the Department assists financially to the extent of $500.00 to Class "A" Exhibitions, and $200.00 to Class "B" Fairs. These sums of money are paid when the required application forms are duly completed, regardless of the amount of cost of procuring judges.

Both Class "A" and Class "B" Exhibitions have an opportunity to qualify for an annual grant of $500.00 *by supporting and featuring Boys' and Girls' Club Work and Junior Farmer Activities.* This may be looked upon as a "special grant to juniors". With most men and women, high idealism and great purpose is never stronger than in youth. This should be recognized in all our planning. The Department is most anxious to support and encourage junior activities with the hope that in doing so a firm foundation is being built. The first essential in order to qualify for junior activities' assistance is that each Agricultural Society shall place the management of this junior section in the hands of a committee that *must* include in its membership at least one representative of the Provincial Department and at least one representative of the Dominion Department of Agriculture, named by the respective Departments. With the formation of this committee, the details and regulations should be adhered to without misunderstanding or difficulty.

Forms for use by an Agricultural Society in making application each year for the amount of financial assistance available, under the three-fold coverage, namely, "Permanent Improvements and Repairs", "Towards the Cost of Providing Judges", and "Grant to Juniors", will be mailed to the secretary. The forms, known as F.P.1, F.P.2, F.P.3, and a statement of work performed with cost figures, should be completed in triplicate and mailed to the district office for the Province of Ontario—Wm. S. McMullen, Dominion Department of Agriculture, 6 Charles St. East, Toronto, Ontario. When transactions are completed for the year, it is urged that all forms be forwarded at the earliest possible date. This will materially assist the Department in an early clearance of inspection of the work performed, thereby making possible prompt settlement of the amount of financial assistance forthcoming.

On behalf of the Dominion Department of Agriculture, I wish to express my appreciation for being included on your programme and for the opportunity provided to speak of the Dominion Fairs Policy. I personally have enjoyed working with the members of the various Agricultural Societies. Your co-operation has been appreciated and I extend to all of you heartiest congratulations on your accomplishments in the work being carried out, in your respective districts, to a successful conclusion in the interests of an improved agriculture.

EDUCATIONAL EXHIBITS

J. H. Leroux, Dominion Department of Agriculture, Ottawa.

THE educational exhibit as contrasted with the purely competitive exhibit is intended to present ideas and to convey information.

It is not a new development but one which has come down to us from primitive times. The early American Indians decorated the outside of their tepees with drawings and symbols which kept out evil spirits and gave information about the owner and his family. Deer antlers and other trophies hung about the entrance proclaimed the hunter's skill. In some parts of the world where a man was judged by the number of his enemies he had killed, their skulls were strung up in front of his house. Five or six skulls dangling from a ridgepole could be considered,

for its purpose, a perfect educational exhibit; it presented the desired information quickly and convincingly.

The usefulness of the educational exhibits depends on the fact that people have always shown great interest in the things they can see and that visual presentations are quickly grasped, easily understood, and long remembered. "One picture is worth ten thousand words" is a frequently quoted proverb among educators.

This natural interest and curiosity in demonstrations, exhibits and pictures is fully appreciated by most business firms. Some large firms in the United States are spending more than a million dollars annually for display advertising and exhibits. Commercial and industrial concerns of all types are showing increasingly great interest in exhibits as an effective means of creating good-will, establishing prestige, and bringing their products or services to the attention of large numbers of potential customers at Fairs and Exhibitions.

The agricultural exhibition has always provided opportunity for the exhibitors to display the latest and best in livestock, crops, and the domestic arts. Government agencies, both Federal and Provincial, exhibit extensively at agricultural Fairs to bring up-to-date information before the public. Useful as these exhibits are, they cannot completely meet present-day needs.

The complexity of modern living has given rise to many problems which require solution on a community basis and which can only be undertaken with the support of large numbers of the local population, both urban and rural. Projects such as town planning, soil and water conservation, recreation centers, reforestation of sub-marginal lands, improved school and hospital facilities, providing of educational and health services through travelling libraries, film centers, farm forums, Women's Institutes, Junior Farmers, local health units and clinics, establishment of co-operatives and credit unions, and many other various undertakings are very necessary to improve our standard of living and to solve the many problems which arise as the community grows and develops. The agricultural Fair presents an excellent opportunity for organizations to point up the need and advantages of such worthwhile projects through educational exhibits. A well-planned exhibit can arouse the interest and win the support needed to successfully launch such a project in your community.

In all its aspects, the agricultural Fair should be considered as an educational institution in the area which it serves. It will fulfill this function only to the extent that it encourages and promotes the spread of information and the development of new ideas which point the way to a better standard of living for all. The agricultural Fair can best serve its purpose as an educational institution by including in its organization the most alert and progressive people in the community and by encouraging local organizations both rural and urban to prepare and display educational exhibits. These exhibits should set as their goal a better informed public on all local problems and to arouse interest and stimulate action directed at the solution of these problems.

As managers and directors you will find such a programme will bring an enthusiastic response from the public and win greater support to your efforts in staging a successful Fair.

SUMMARY OF ADDRESS

By MR. BLIGH DODDS, of Gouveneur, N.Y., Past President of the International Association of Fairs and Exhibitions.

INTRODUCED by Mr. J. A. Carroll, Superintendent, Mr. Dodds opened his remarks by complimenting the Canadian National Exhibition as being the greatest Fair in North America. He then outlined to us the operation of State Fairs in New York State, pointing out that New York State allotted $500,000.00 for agricultural premiums, with a maximum of $10,000.00 going to any one Fair. There was, he said, rigid supervision by the Department of Agriculture governing sanitation, policing, games. State police were provided for every Fair, and veterinarians were provided to enforce health regulations. At Gouveneur $25,000.00 was offered in premiums. He emphasized the need of giving the largest amount of premiums for the products of the particular district in which a Fair was held. He said, "Encourage youth in every way possible by allotting to them a good share of prize money. At Gouveneur, for example, $5,000.00 was allotted to the Junior Department, the County 4H Leaders setting up the prize lists, and 900 juniors took part, drawing $4,500.00 in prize money. The balance of the prize money was divided as $5,000.00 for cattle, $3,000.00 for horses, $1,000.00 for butter and cheese products." He then referred to the organization known as Grangers, which probably is similar to our Farm Forums. Prizes are offered to the Grangers for exhibits at the Fair. Every Granger registers and a prize goes to the Grange which has the largest representation at the Fair. The Junior Institute 4-H Clubs put on a style show, and every day becomes a special day at Gouveneur Fair, such as Thrill Show Day, 4-H Day, American Legion Day, Children's Day, etc. Harness races were encouraged and their purses for same ranged from $2,800.00 to $4,500.00.

RESOLUTIONS

1. That we express our appreciation to Mr. Bligh Dodds for his kindness in visiting our convention and delivering such a splendid address, and extend to him our very good wishes for the future.
2. That we express our appreciation and confidence in our Superintendent, Mr. J. A. Carroll, and his staff, for their efficient services during the past year.
3. That we request the Federal Government, through the Department of Agriculture, to consider the possibility of including some classes in the Women's Department as utility classes in order that Fairs might qualify for their annual grant.
4. That we extend, on behalf of all of our members, sincere thanks to our President, Mr. Brodie Ness, for his excellent work during the year.
5. That we send greetings to, and the confidence of this Class "B" Association of Fairs and Exhibitions, to the Honourable T. L. Kennedy, Minister of Agriculture, and also to the Honourable James C. Gardiner, Federal Minister of Agriculture.

6. That we express the thanks of this Association to the management of the King Edward Hotel for their co-operation.

At the request of the Ontario Cattle Breeders' Association, the following resolutions were approved:

"Whereas a standard classification on the health standing of show animals is desirable for all shows in the Province of Ontario, be it resolved that all cattle up to 30 months of age (up to senior yearlings) be eligible to show at Class 'A' and Class 'B' Fairs regardless of their blood status, provided they have been vaccinated and an official certificate of vaccination issued, showing that the vaccination was done before the animal had reached nine months of age."

"Whereas it has been drawn to our attention that at many of the smaller Fairs in the province where classes are provided for pure bred cattle there are numerous abuses, such as showing cattle in the wrong class, showing grades with purebreds, wrong ownership, etc.; be it resolved that the Agricultural Societies' Branch of the Ontario Department of Agriculture be respectfully requested to make payment of their grant for pure bred cattle classes contingent on the checking of the identity of the animals shown, by a representative of the Fair Board; this check to be made by means of the registration certificate and the colour markings as indicated thereon or on the reverse side."

ONTARIO PLOWMEN'S ASSOCIATION
38th ANNUAL REPORT

ROY SHAVER, Finch
President

1950 Officers

Honorary Presidents	Rt. Hon. J. G. Gardiner, Ottawa Col. the Hon. Thomas L. Kennedy, Toronto Col. the Hon. J. J. Duffus, Peterborough
Past President	V. C. Porteous, Owen Sound, R.R. 3
President	Roy Shaver, Finch
1st Vice-President	W. R. Bullick, Camlachie, R.R. 2
2nd Vice-President	Russell Beilhartz, Bruce Station
Secretary-Manager	J. A. Carroll, Toronto
Treasurer	Clark Young, Milliken
Auditor	J. R. Herrington, Richmond Hill

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No. 1—W. R. Bullick, Camlachie, R.R. 2; Geo. Fletcher, Merlin, R.R. 1.

No. 2—Geo. Waldie, Stratford, R.R. 2; Kenneth Bawden, St. Thomas, R.R. 7.

No. 3—W. C. Barrie, Galt, R.R. 7; Elliott Moses, Indian Office, Brantford; Alston Campbell, Burford.

No. 4—Stanley Young, Caistor Centre; Malen O. Wilkins, Jarvis, R.R. 3.

No. 5—Gordon McGavin, Walton; V. C. Porteous, Owen Sound, R.R. 3.

No. 6—Alex McKinney, Jr., Brampton, R.R. 2; Alex Black, Guelph, R.R. 2; Stanley Hall, M.P.P., Streetsville, R.R. 2.

No. 7—W. L. Clark, Gormley; Walter Downey, Minesing.

No. 8—H. A. Quinn, Peterborough, R.R. 9; John Mark, Cameron.

No. 9—J. R. Henderson, Kingston, R.R. 7; Hubert Avery, Brockville, R.R. 3; Harvey Hawkey, Kingston, R.R. 2.

No. 10—Roy Shaver, Finch; Geo. Hay, Marvelville.

No. 11 and 12—Russell Beilhartz, Bruce Station.

Honorary Life Director

Col. Geo. B. Little, Agincourt.

Honorary Directors

D. D. Gray, Ottawa; J. J. Tierney, Algonquin; F. G. Fuller, London, R.R. 7; W. D. Lindsay, Hagersville.

Executive

The Officers and Gordon McGavin, Alex McKinney, Jr.; Geo. Waldie, W. L. Clark, W. C. Barrie, and Elliott Moses.

Representatives

Ontario Federation of Agriculture—Alex McKinney, Jr. (Director); W. C. Barrie, and Geo. Waldie.

PAST PRESIDENTS

1911—*Simpson Rennie, Agincourt
1912—*Simpson Rennie, Agincourt
1913— Frank Weir, Agincourt
1914—*James McLean, Richmond Hill
1915— A. P. Pollard, Port Hope
1916—*Wm. Doherty, Toronto
1917— L. W. Smith, Millbrook
1918— W. C. Barrie, Galt, R.R. No. 7
1919— W. B. Barrie, Galt, R.R. No. 7
1920— A. E. Wilson, Perrytown
1921— D. D. Gray, Ottawa
1922—*A. B. Rose, Echo Place
1923— Col. Geo. B. Little, Agincourt
1924—*W. H. Patterson, Agincourt
1925—*Roy H. Abraham, Chatham
1926— Col. the Hon. J. J. Duffus, Peterborough
1927— M. O. Bingeman, V.S., Waterloo
1928— J. J. Tierney, Algonquin
1929— J. J. Tierney, Algonquin
1930— L. H. Winslow, Millbrook
1931—*D. A. McIntyre, Alvinston
1932—*Neil Calder, Holstein
1933— Elliott Moses, Ohsweken
1934— F. G. Fuller, London, R.R. No. 7
1935—*J. Lockie Wilson, Toronto
1936— George Waldie, Stratford
1937— J. W. McRae, Kemptville
1938— J. W. McRae, Kemptville
1939— J. R. Henderson, Portsmouth
1940— Alex. McKinney, Jr., Brampton, R.R. No. 2
1941— J. Blair Ketchen, Fergus
1942— Gordon McGavin, Walton
1943— Gordon McGavin, Walton
1944— Gordon McGavin, Walton
1945— Gordon McGavin, Walton
1946— Gordon McGavin, Walton
1947— W. L. Clark, Gormley
1948— Walter Downey, Minesing
1949— V. C. Porteous, Owen Sound

*Deceased.

PRESIDENT'S ADDRESS

V. C. Porteous, Owen Sound, R.R. 3.

I WISH to extend to you all a hearty welcome to this the 40th annual meeting of the Ontario Plowman's Association. Plowing is the one primitive and ancient art in soil culture that has withstood every ridicule and onslaught of scientific progress and still holds the prime position in crop production. This organization has in the past and will continue to give leadership in the progress of soil culture and therefore is one of, if not the most important organizational factor towards better agriculture methods and cultural advancement.

Better farming and crop production is especially important during years of scarcity, and the past decade has convinced everyone who has given any thought to the future of supply and demand, or might I say production and consumption, of the importance of farm organizations, especially those which lend themselves to increased production and soil conservation.

It would appear at the moment that in the past year we were achieving our purpose in production as compared to consumption, but the fact still remains that the good producer will continue to survive even under adverse conditions. We can therefore expect reasonable prosperity for the efficient farmer.

In the march of progress of this organization we are now concluding the most successful year in our history. In the Brant County plowing match and farm machinery demonstration we made progressive history from every angle. The farm machinery exhibit was the largest and most complete in the history of this organization. The plowing, both in entry and quality surpassed any previous attempt, and the organization was most complete. The plowing match, of course, speaks for itself, and Mr. Carroll, our efficient and worthy secretary, will report on that later, but I must say a few words about organization.

No organization is completely successful without finances. The finances, so far as the plowing match is concerned, are divided into two (sometimes I think not too definitely defined) channels. The one, the O.P.A., and the other, the local committee. Tribute must be paid to the treasurer of the O.P.A. for the way he surveys the grounds in the tented city, allocates the concessions and, most important, collects the accounts. I refer to Mr. Clark Young. So far as the local committe is concerned the finances are largely admission and parking fees. Under the efficient chairmanship of Mr. Alston Campbell, together with the treasurer, Mr. Don McLellan, and his assistant, Mr. R. J. Sim, these angles were completely taken care of and we had no worries even though our ambitions were somewhat dampened the first day.

I do wish to state that it is very essential that the duties and responsibilities of the local committee be very clearly and definitely defined in the future so that no misunderstandings will arise. As you all know, this organization, having reached the magnitude which it now has, there are many more obstacles to contend with than when it operated on a smaller scale.

To this end we have for next year gone over some of what might be contentious matters with the Simcoe County committee and have every reason to believe that

our meetings with that committee have been successful from every angle. Further, reporting from that angle, the location has been selected and further organization will continue immediately after this meeting.

It seems to me as the years pass, due to experience and other factors, we are getting a more efficient organization, and I wish to give a good deal of credit to two of the directors of the O.P.A. Due to their leadership and experience and the way they applied their talents, we achieved the greatest local organization of all time. I refer to W. C. Barrie and Elliott Moses. I wish also to refer to one other director and past president of the O.P.A. on the efficient and successful way in which he handled the selection and allocation of lands. My reference is to Mr. Alex. McKinney.

I would indeed be remiss in my duty as president were I not particular to mention the local committee in Brant County. They did, beginning back at least two years, lend their every effort to a successful organization, and I must say that it was with reward when they completed the match this year. I would like to mention many or all of the committee chairmen, but time or space will not permit, but I do wish to mention two in particular, that is the chairman, Mr. Ken Armstrong, and the secretary, Mr. Len McQuay.

As I stated at the annual banquet at the Plowing Match, I think we have one of the most democratic of all farm organizations. We encourage with all our might, fair and keen competition and we rewarded the competitor according to his or her merit. That is the principle on which we operate and thereby promote the stabilization of democratic principles and faith in all democratic achievement. These rewards are made as encouraging as possible and of course the highest reward that we have to offer . . . is the Trans-Atlantic Trip. The winners, Jim Eccles, Brampton, and Ronald Marquis, Sutherland . . . together with their manager, Alex. McKinney, are in Ireland getting ready for the Irish match on Feb. 8th. We wish them every success and know we will be well represented there.

As most of you are aware, my duties as president will cease with this annual meeting, and I wish to say in closing that it has given me the greatest of satisfaction to work with the other officers of this organization. I can truthfully say that I never worked with a more sincere and conscientious group. I make special mention of the secretary, Mr. Carroll, and his assistant, Mr. Lashley, and the girls of the office staff. I wish to thank you all for your hearty co-operation, and wish this organization continued success.

REPORT OF SECRETARY-MANAGER

J. A. CARROLL, Toronto, Ontario.

THE Brant Match of 1949 was certainly the largest and in many ways the most interesting yet held. Weather contributed to the interest, and also to the anxiety of the local committee and the O.P.A. Board, by bringing such a downpour that on Wednesday morning it was deemed necessary to postpone all events coming thereafter for one day.

There were more entries, the largest "Tented City", and greater attendance than at any previous match. A total of 1,178 entries established a new record by an increase of about 250 over 1948. Actually at 934 there were more tractor entries at Brant than the total entry at the previous match. This was a little surprising to all concerned, as a new rule placed a restriction on entries. It was evident that the general interest in match plowing, the central location, the enthusiasm of the Brant committee, and the early season farms were all contributing factors.

ENTRIES

	Horses	*Tractors*	*Total*
October 11 (Tuesday)	41	126	167
October 13 (Thursday)	74	319	393
October 14 (Friday)	59	298	357
October 15 (Saturday)	70	191	261
	244	934	1,178

This large entry, heavier in tractor classes, placed a heavy strain on the management, particularly the land committee. To their credit and the excellent nature of the site, the entire process of allotting lands, getting competitors to their fields and finishing in good time was never done better. The committee concerned are congratulated.

The change in system proved a marked improvement. With all entries in the night before (after Tuesday), the land committee had ample opportunity for careful checking. Competitors were relieved of a rush to the office before 8 a.m. to enter, lands could be drawn earlier, and the outfits moved to the lots drawn without confusion or delay.

The county tractor committee never had a greater task, and never was it better done. A total of 375 tractors were lined up in orderly arrangement, and the allotting of tractors and the movement of them to the field was worked out with clock-like precision. Whether an entry of 144 in one class is justified, certainly it was a great thrill to see that parade of tractors filing out of the park in orderly manner.

To meet changing conditions and assist the local committee, three classes were confined to "row-crop type" tractors. The largest number used was 42 and 20 were applied for in advance.

The new system of taking entries permitted the Family Herald and Weekly Star, good friends for many years, to do a much better job. They added to the

service this year by printing not only the entries for the day, but the prize winners of the previous day, a map of the grounds and the demonstrations that were to be carried on that day.

The attendance, estimated by some at close to 200,000, was certainly away beyond any previous record. The crowd on Thursday, while reassuring to the treasurers, was frustrating to many caught in slow moving lines, and embarrassing to the traffic and parking committee. While the crowd on Wednesday surprised everyone, in spite of the rain, many had postponed their visit and piled in on Thursday. The crowd amazed everyone, including the Provincial Police, who gained experience for later days, and there were no complaints after Thursday.

The "Tented City", always unique, housed the greatest exhibit of farm equipment and supplies ever staged in Canada, and perhaps on the continent. The area was extended to 2,400 feet in length. Space was occupied by:

Tenants	*Frontage*
137 Exhibitors	6,218 feet
70 Caterers	1,622 feet
20 Educational exhibits	835 feet
227	8,675 feet

Contour Plowing at International Plowing Match, Brant County.

DEMONSTRATIONS

An important addition was made to the educational programme by the Ontario Fire Marshal's Department. Demonstrations were given daily on small extinguishers and portable equipment. Modern trucks were displayed carrying some 2,000 gallons of water.

Fire protection was given the "Tented City", and four small fires were extinguished. Information was given to hundreds of visitors, particularly to municipal officers.

On Friday, the Hon. Leslie M. Frost, Prime Minister of Ontario, visited the match, accompanied by several members of the Cabinet. After touring exhibit streets and studying some of the displays, the party witnessed a fire control demonstration in the horse show ring. Several of the plowing fields were visited, and the competitors complimented.

A tractor driving competition, open to Junior Farmers, was a new feature which attracted crowds daily.

The Dominion Horseshoe Pitchers' Association arranged an exhibition game between Dominion Champion Dean McLaughlin, Oshawa, and runner-up, Walter Woodward, Cooksville.

OFFICIAL OPENING

The opening was most colourful, and was surprisingly well attended, when it was found necessary to postpone it from the announced time to 4 p.m. on Wednesday. As the match was held in Brant, the long established home of the loyal Six Nations Indians, it was logical they should be invited to participate. Brig. O. M. Martin, now magistrate in Toronto, gave the opening address, and was well supported by the Six Nations Brass Band and troupe of dancers in native costumes.

The agricultural industry of the County was well represented in the county exhibit tent, and the antique display, under the direction of the Brant Historical Society, was an added feature much appreciated by the visitors, who crowded the tent each day.

BANQUET

The banquet tendered by the City of Brantford was a delightful affair, in spite of the shift from Friday to Saturday, which prevented some guests from attending, including the guest speaker, the Hon. Leslie M. Frost, Premier of Ontario. The hangar at the Brantford Airport provided ample accommodation for 1,200, for which provision was made, with plenty of parking space. The Juniors of Brant handled the colossal task of catering in an admirable way. The Hon. W. G. Hamilton, as guest speaker, delightful entertainment, followed by the presentation of trophies, provided a fitting closing to the big match.

Indians Taking Part in Opening Exercises, International Plowing Match, Brant County.

WINNERS OF SPECIAL CLASSES

Trans-Atlantic Class—Horses—Imperial Oil Ltd.—
Gold Medalist—Ronald Marquis, Sunderland.
Silver Medalist—N. Jarvis, Markham.

Trans-Atlantic Class—Tractors—Imperial Oil Ltd.—
Gold Medalist—Jim Eccles, Brampton.
Silver Medalist—Douglas Campbell, Cainsville.

Inter-County Competition—Horses—Salada Tea Co. of Canada Ltd.
Conservation tour of Southern States—

1st—Haldimand County.
Coach—Agricultural Representative A. G. Skinner.
Team members—Earl Bacher, Cayuga; Robert Nixon, Hagersville.

2nd—York County.
Coach—Agricultural Representative W. M. Cockburn.
Team members—Eugene Timbers, Milliken; Norman Watson, Woodbridge.
High contestant—Eugene Timbers, Woodbridge.

Inter-County Competition—Tractors—British-American Oil Co.—
Trip to Chicago—

County—Haldimand.

Coach—A. G. Skinner, Agricultural Representative.

Team members—Earl Fleming, Hagersville; William Waldbrook, Hagersville.

High contestant—William Waldbrook, Hagersville—Fred G. Fuller Trophy.

Horse Show Winners—

Local—Teams and Equipment—Zimmerman Bros., Tavistock.
Best plow team—Norman Mike, Ohsweken.

Open—Zimmerman Brothers.

Horse-Shoeing Championship—Tie: Frank Reid, Thornhill;
Stan Sargent, Toronto.

All of these are congratulated, but special reference is made to the remarkable achievement of Haldimand County by winning both of the coveted top awards in Inter-County team classes.

BRANCH ACTIVITIES

Events	1948	1949	*Change*
Senior Match	68	70	+ 2
Junior Match	7	15	+ 8
Home Plowing	5	4	— 1
Demonstrations	15	31	+ 16
Senior Match Entries—			
Tractors	1,003	1,518	+ 513
Horses	738	831	+ 93
Total	1,741	2,349	+ 608

These tables reflect a sharp upward trend in match plowing interest and activity. No doubt the season was favourable, but we believe attractive International and local prize lists, and the new rule requiring prospective competitors at the big match to have plowed at a Branch, were contributing factors.

Tilbury East and Romney, and Durham, were the two matches held in 1949 and not in 1948.

High Entries	
Wellington	79
Peel	69
East York	65
Halton	65
King and Vaughan	63

Cash Prizes Paid	
King and Vaughan	$655.15
Tilbury E. and Romney	576.00
South Simcoe	565.75
York East	526.28
Victoria County	518.00
York North	515.00

The trend to mechanization is noticeable at the matches, but whereas the ratio at the International was 3.5 tractors to 1 horse, it was less than 2 to 1 at Branch matches.

Highest Tractor Entries		*Highest Horse Entries*	
Wellington County	66	Brant County	29
St. Vincent	45	York East	29
Peel County	44		

Branches with more horse than tractor entries—St. Joseph's Island, Ontario North; Brant County, Ontario South; Mohawk (Hastings), Clarence; Wikwemikong, Russell County; Ancaster, Chelmsford.

SUMMARY OF JUDGES' REPORTS

	1948	1949	*Change*
Judging completed before spectators left	51	53	+ 2
Award cards placed before spectators left	26	46	+ 20
Identification for officers	48	48	— 1
Judges supplied with books, etc.	41	52	+ 11
Educational features	19	43	+ 24
Loud speaker systems	24	33	+ 9

HIGH SCHOOL PLOWING MATCHES

The principal of Palmerston High School, Mr. E. C. Gray, encouraged and assisted by the Wellington County Branch in 1948, opened a stimulating avenue to students of agriculture, and incidentally revealed a promising source of prospective competitors at plowing matches. This will be reported and discussed by several speakers on this programme. As a result of the address by S. B. Stothers at the last annual convention, a similar plan was carried out at Drayton and Athens. In South Huron an inter-school match attracted keen interest.

The possibilities are indicated by the increase in entries at the Wellington matches—1947, 30 entries; 1949, 79 entries.

J. LOCKIE WILSON MEMORIAL

The second award was presented by the secretary at a college function on March 26, 1949, to: J. M. Saville, H. A. Carruthers, K. L. McGregor, A. G. McKay.

TRANS-ATLANTIC TRIP—IMPERIAL OIL LIMITED

Winners—Ronald Marquis, Sunderland; Jim Eccles, Brampton.

Manager—Alex. McKinney, Jr., Brampton.

The party left Toronto on January 10th to enjoy an interesting tour arranged by friends across the Atlantic, under the leadership of Major J. S. P. Armstrong, Ontario House. An interesting departure has been made in that three continental countries will be visited: Denmark, West Germany and Holland.

To do this it was necessary to curtail the time in Britain, and miss the Workington Match in the North of England. At Newquay, on January 20th, James Eccles won 3rd and Ronald Marquis 5th. They have both entered for the Irish International, February 8th, and plan to use British type match plows.

ITINERARY

January 10—Leave Toronto.
12—Sail on Queen Mary from New York.
18—Arrive Southampton, leave for Newquay.
19—Practice for match.
20—Plowing match.

Champion Ontario Plowmen

Col. the Hon. T. L. Kennedy, Ontario Minister of Agriculture, sits smilingly between the two champion plowmen before a luncheon at which Imperial Oil Ltd. was host. The luncheon marked the departure of the two young men for overseas as guests of the oil company. Left to right those in the photo, taken in the library at the Royal York Hotel, are: J. M. Eccles, Brampton, one of the winning plowmen; Col. Kennedy; R. K. Marquis, Sunderland, the other winner; C. D. Graham, Deputy Minister of Agriculture. Back row—V. C. Porteous, president of the Ontario Plowmen's Association; Alex. McKinney, Jr., team manager; G. W. Mills, advertising manager, Imperial Oil; J. A. Carroll, secretary-manager of the Ontario Plowmen's Association.

21—Return to London—sight-seeing.
24—Leave for Amsterdam.
28—Arrive in Hamburg.
30—Leave Hamburg for Holland.

February 3—Leave for London, and Ireland.
4—Arrive Ireland.
7—Plowing practice.
8—Plowing match.
10—Leave for Scotland.
15—Return to London.
18—Leave for Canada, T.C.A.

BRITISH MATCH STANDARDS

The December 30th issue of the Farmers Weekly, England, carries a very interesting article by Alfred Hall, Secretary of the Agricultural Society, Workington, Cumberland. Apparently there had been some criticism over suggestions that plowing matches were waning, but Mr. Hall produced the evidence that exactly the opposite was true. He pointed out the increased need for matches, as farmers had been forced to employ inexperienced plowmen during the war.

After discussing various types of plows, prevailing in different parts of England, he emphasized the need for uniform standards and made complimentary reference to us, part of which is quoted:

"The Canadians seem to be nearest solving the problem. In Britain we decide that a furrow shall be of certain dimensions and care not what type of plow is used. Thus we do find competitors trying to turn 11-in. furrows with 8-in. shares. The Canadians, however, decide that a furrow shall be plowed by a standard plow. This implement is known as a Jointer plow, and is one with a share measuring not less than 8 in., and with a breast measuring not less than 6½ inches."

He then gave specifications as outlined by the "Ontario Plowmen's Association": "This arrangement settles the problem of setting a standard of general purpose work. It also standardizes plow equipment. Jointer work, as it is known, satisfies all the requirements of good plowing, and I feel sure would be rapidly adopted in Britain if manufacturers would build plows to "Jointer" specifications.

"Canadian 'high-cut' is as out of date commercially as is our 'oat seed', but it is nevertheless still regarded as the acme of good plowing."

DURHAM, 1853

Evidence is provided by the Port Hope Guide, May 21, 1853, that plowing matches have been held in Durham County for a long time. Extracts will be of interest:

"In consequence of a late beginning the work was not completed until about 3 o'clock, when the judges, having examined the work and given in their deci-

sion, a generous invitation was given by Mr. Morrow to all present to a dinner gratuitously furnished."

"Though the object of the Society, in getting up plowing matches, is not intended to test merits of the different implements, yet the manufacturers view it in this light, and we hope that the Society will take the advice of our friend, W. H. Allen, Esq., and adopt some method of testing the merits of the different plows."

"We understand that Mr. Porter made a present of the plow used on this occasion to his plowman, as a reward of the manner in which he tested its efficiency."

CONSERVATION

In June your Board took advantage of the opportunity to present a brief to the Select Committee of the Legislature on Conservation. This covered the contribution made by plowmen and some definite recommendations on soil cultivation and machinery, and was concluded with this paragraph:

"Finally, gentlemen, all will agree efficient plowing and proper cultivation to be of first importance alike in profitable crop production and soil conservation. You may depend on this Association to continue to work to this end. You are also assured of full co-operation in those phases of conservation which might properly come within our field."

On your behalf, we express thanks to the press, radio, donors and all other co-operators.

WHAT THE JUNIORS ARE DOING IN LEEDS

J. R. Ostler, Brockville.

A VERY brief report to your secretary-manager on the activities of our Leeds County Plowmen's Association during the past year is responsible for my appearance on your programme for a few minutes.

If our experiences in Leeds County are a help to you in your county endeavours and I am able to explain them in the manner that they will be of use to you and of interest to the officials of O.P.A., then I am glad I have come. For this reason I want to express my appreciation for the opportunity of appearing before you. I feel I am doing so on behalf of our County Association, and if our Association has done anything, even though small, to contribute to better accomplishments in agriculture, I am proud to represent it.

The Leeds County Plowmen's Association is to be complimented in 1949 for increased activity, increased interest, and a better programme.

The most encouraging new feature of our match was the establishment of a special class for Athens High School pupils. This was preceded by a coaching class a week previous to the match, not only for high school pupils but any other plowmen as well. It was almost a plowing match in itself, with sixteen prospective

contestants, each plowing a small land. The six—five boys and one girl—who came from Athens High School, an average distance of 25 miles, all competed at the match a week later.

The fifty-one contestants who competed at our annual plowing match created a record for this county and was about double the average number of contestants. The attendance was estimated at over 1,500. Of the contestants, 39 were with tractors and 12 with horse plows. The annual banquet was attended by 155. Perhaps little more need be said but some explanation might be in order.

The number of juniors who took part in our plowing match last year is not significant. Several counties have more. It is the increase over previous years. From the beginning of the last war, the participation of juniors has been small and discouraging. Boys' and girls' classes, for both tractors and teams, were always provided in the prize list with as much prize money as for senior classes, yet year after year there was little competition or none at all in some classes.

The germ of the idea for this new feature, which proved so satisfactory to us, came from this annual meeting a year ago. It was a talk by S. B. Stothers on the successful project with high school pupils in Wellington County. Hubert Avery, one of your younger directors of the O.P.A., and from Leeds County, brought back the idea. We considered there was a possibility of using the same plans with some modifications. Though the site of our match was approximately 20 miles distant from our County High School at Athens, and many of the pupils resided even farther away, we proposed the idea to the principal. Mr. L. A. Hetanen is a graduate of the Ontario Agricultural College, teaches agriculture and promotes it at every opportunity. To him goes a great deal of credit, for without his enthusiastic promotion and leadership, nothing would have come of it. We proposed that a tractor plow class eligible only to Athens High School pupils, boys or girls, would be provided at the match and that a coaching class would be arranged previous to the match.

The High School pupils attended the coaching class, held on a Saturday, at the site of the match and just a week previous to it. Arranging both events on a Saturday probably helped considerably. Some pupils were accompanied by their parents, and Mr. Hetanen was right on the job. The coach, Mr. Fred Timbers, did a splendid job despite the fact that he had ten others to coach besides the six pupils. The only special inducement offered the high school pupils to attend the coaching class was that two dollars would be added to the prize monies awarded at the plowing match provided that pupil had attended and plowed at the coaching class. All but one qualified.

One of the satisfying situations in this high school pupil feature is that all six contestants came from communities from which we have had little or no plowmen competing at our annual plowing matches. Thus we have broken new territory and new blood has been introduced. Incidentally, our regular class in tractor plows for boys and girls under 20 years of age was the best it has ever been. While only five competed, no more than three competitors had been in this class in any previous year, usually less, and one year none at all. Perhaps our high school class created some interest and enthusiasm or perhaps it was because we had our match on

Saturday for the first time. Perhaps both had something to do with it. We look forward to the continuation of our new feature and have confidence that it can do much, not only for the county plowing match, but for greater interest in agricultural activities. We feel it opens greater possibilities.

We believe this is quite sound from a high school point of view, having in mind the importance which should be placed on the proper adjustment and use of implements of all kinds in this mechanized age.

The increase in young people participating, also in total entries and attendance, is encouraging to our Association. In conclusion, I would like to emphasize that, in my opinion, there are two or three essentials to make this new feature a success:

1. The full support and active co-operation of the high school official or officials concerned.
2. A good coaching class previous to the competition.
3. It may be necessary to hold these events on a Saturday or at least at a time compatable to the school programme.

INTER-SCHOOL COMPETITION

L. P. Plumsteel, Seaforth.

I HAVE been asked to attend this convention as one who is particularly interested in plowing matches. Perhaps it would be proper to explain first of all why I, as a high school principal, should take such an interest in this type of competition.

For a great many years our high schools were criticized by the rural people for educating the farm boys and girls away from the farm. And, in my opinion, the criticism was to a large extent justified. Now, with the formation of high school districts throughout the province and the tremendous increase in enrolment in our high schools of pupils from the rural areas, it becomes increasingly important that we avoid criticism on that score in the future. To that end courses in agriculture, shop work and home economics have been added in many of our smaller high schools over the past few years.

In our school, interest in agriculture was high when I came to Seaforth in the fall of 1948. When the high school district was formed, Colonel Kennedy expressed the hope that agriculture would be given a prominent place in the curriculum. Night classes in agriculture for adults were organized through Mr. Gordon Bennett, the Agricultural Representative for Huron County. The members of the School Board were willing to co-operate in any plan which would further this interest in agriculture. To that end they purchased, last year, a five-acre plot of land immediately adjacent to the school. This spring they intend to purchase a pony tractor and the necessary implements to work the land.

It was the purchase of this land which was responsible for the inter-school plowing match held in Seaforth last fall. One night after a board meeting, while

lunching with Mr. Bolton and Mr. McGavin, two members of the board, mention was made of the fact that it was time the land was plowed. Mr. McGavin, who seems to take a *slight* interest in plowing matches, suggested the possibility of an inter-school match to get the land plowed and have some competition at the same time. The more I thought of the idea the better I liked it, especially since I realized that Mr. McGavin would have to do a great deal of work because I knew nothing about plowing matches. The next morning I phoned the principals of Palmerston, Mitchell and Clinton, and challenged them to a plowing match to be held at Seaforth. Mr. Gray, of Palmerston, and Mr. Fines, of Clinton, accepted the challenge. I thought that before I issued any further challenges I had better find out how many contestants our field could accommodate. It was finally decided to have two classes, junior and senior, and to have just the three schools in the match for the first year. Each school could enter a team in each of the two classes, junior and senior. A team was to consist of four boys, two plow-boys and two seconds or assistants. Palmerston and Seaforth each entered teams in both classes, while Clinton entered a team in the junior class only, so we had ten tractors and plows in the match. Mr. F. H. Bell, of Stratford, acted as judge and did a splendid job, not only in judging, but in pointing out to the boys, after the match, the good features of their work in suggesting to them defects which lost them points in the judging.

I have some pictures here which Mr. Morrison, our agriculture teacher, took on the day of the match. I had a few of them enlarged and I shall be happy to pass them around so that you may get some idea of the calibre of the work done at our match.

I mentioned at the beginning the increasing importance which our smaller rural high schools are placing on the teaching of agriculture and other so-called practical subjects. I should like now to explain my own particular interest in plowing matches, especially the kind we had in Seaforth. Ours was different in one respect only; the boys plowed not as individuals competing against other individuals, but as members of a team competing against other teams. It has always seemed to me that the town boys have a natural advantage over the farm boys in competition for places on all the teams in high school sports. They can practice after four, when the rural lads have to leave on the school bus, and since the town boys live so close together they can easily gather together a sufficient number for a practice. But a plowing match is something at which the farm boys have not only an advantage but a monopoly, hence it appeals to me as a method of increasing the sense of importance of our rural school students while at the same time keeping their interest in an activity essentially rural—that of plowing. We want our rural boys and girls to come to high school, but we must try to develop in them a sense of pride in the fact that they do come from the farm and a desire to return to the farm after they have completed their education.

And that brings me to the point of making a suggestion, if I may, for your consideration at this convention. I know that the county plowing matches, and the International Plowing Match have classes for boys of high school age, in which they compete as individuals. I would like very much to see another class added for

team competition for schools. A team to consist of any number deemed best by the directors of the Plowmen's Association. The ideal set-up, I think, would be for each county match to have a class for all schools in their county and thus secure a winning team from each county. These teams could then compete at the International Plowing Match and the winning school team would be grand champion for that year. Such a class would, I am sure, add considerable interest to any match, and would also foster interest in plowing among the Junior Farmers of the province, ends which I am confident would please the members of the Plowmens' Association.

HOW JUNIOR FARMERS AND HIGH SCHOOL STUDENTS CO-OPERATE IN WELLINGTON

H. L. CASSIE, Fergus.

WELLINGTON County plowing matches have had their share of success ever since the Provincial match was held in Fergus prior to the last world war. Like other plowing matches throughout the province, the war necessitated their discontinuance for the duration.

In 1946 we again held a plowing match on the Elora highway, three miles above the town on the farm of Mr. Jas. Burnett. This is one of the better farms in the county with a lovely setting, and the day of our match was an ideal Ontario autumn day. On Mr. Burnett's farm there were over 2,000 cars and over 5,000 people. From the point of view of a plowman the land could not be improved. We had in all 15 contestants, with a prize list of over $500.00 contributed from the usual sources, i.e., the merchants from the nearest towns plus our usual grants.

In 1947 our plowing match was held at Mr. Blacklock's farm alongside the Ontario Reformatory. Here also we were blessed with as many or more spectators, and our total competitors were 22.

When you have cars and people by the thousands and 15 or 20 contestants, you are rather nonplussed to know where we, as directors, are at fault. The fact that there are so many people attending means that interest in these matches has not died out. In looking over our entry list we found the average contestant had been competing for upwards of 20 years; also it might interest you to know that at the conclusion of World War II the average age of Wellington County farmers was close to 60 years.

Keeping these factors in mind, it is apparent to all of us that we must interest a fresh class of young people in farming and agricultural pursuits. At that time our Junior Farmers were only commencing to be organized. We, therefore, thought of our school and an even younger class of boys and girls, and hoped that we could interest a high school principal in the county to the extent that he would assist us in including at least 10 boys and girls from his school to enter our plowing competition.

Palmerston School Board had just expended between $20,000 and $30,000 in a new agricultural wing to their high school. We approached Mr. E. Grey,

principal of the school. After explaining the situation to him he was very enthused with the idea of using our plowing match in the nature of an "achievement day" for his agricultural work. He assured us that he would have between 20 and 30 contestants in the match if held near Palmerston. He also assured us of strong financial support from the citizens of Palmerston. Both these promises he quite fulfilled.

In 1948 our first match in Palmerston had 45 contestants, 27 of them from Palmerston school. In 1949 we had 85 contestants, 48 from Palmerston High School. At this match we had 76 tractors supplied by the surrounding farmers, implement men, etc., and nine teams. Of these contestants there were several boys 14 years of age. Of the boys living in the village whose people were not engaged in farming, five placed. All the girl contestants used tractors.

Mr. Grey believes that plowing matches are very important, more so than Fall Fairs. He thinks that inter-school competitions would be equally important with track meets, basketball leagues or any other inter-school competition.

Palmerston School places agriculture on a par with other options. Agriculture may be taken in place of Latin. In this school, with a roll of 200, there are 21 boys in Grade XIII. Not only are they having less difficulty in getting the boys of Palmerston to finish their secondary education but Mr. Grey also thinks that the school feeling has been more closely cemented, the parents' interest is much greater and the boys are receiving a solid, practical foundation for their studies in the theory of science and agriculture. We, on our part, appreciate the help he has given us. We know that we now have sufficient contestants to make any plowing match in Wellington County a success for 20 years.

Our Junior Farmers this year held a plowing match in Peel Township with 13 contestants and paid out $106.50 in prize money. In Erin Township they had 21 contestants and paid out $99.00. In each of the above two matches they held a tractor rodeo with a total of 53 contestants.

We in Wellington County do not know whether we are fortunate in having more co-operation than we expected, but from the interest shown and the time and labour put on this matter by Mr. Grey and his staff, as well as the support given by Mr. Davies and his department in Toronto, we think we have solved the problem of holding successful plowing matches.

TRACTOR MAINTENANCE CLUBS AND JUNIOR FARMER FARM EQUIPMENT PROJECTS

A. M. Barr, Ontario Department of Agriculture, Toronto.

The Ontario Department of Agriculture, realizing the very great extent to which the farms of Ontario have become mechanized in the past few years, in 1949 inaugurated two projects in connection with tractor and farm machinery operation.

It is quite evident that rural boys and young men on farms are keenly interested in machinery or mechanized farming. Agricultural projects have proven the most effective means of training boys and girls in various lines of agricultural

production on a large number of our Ontario farms. It is conceivable that tractor or farm machinery projects can be a very useful means of teaching our boys and young men some of the fundamental principles involved in the safe and economical operation of tractors and farm machinery. To that end, the Tractor Maintenance Clubs were organized early in the Spring of 1949, and the Farm Machinery Project for Junior Farmers came into operation later on in the Summer.

Tractor Maintenance Clubs

The main objective in the Tractor Maintenance Clubs is to promote safe, economical operation of the farm tractor. Membership in 1949 was open to farm boys 12 to 20 years of age. The minimum age limit for 1950 has been increased to 14 years of age. Despite the fact that there are some 12 and 13-year-old boys capable of operating tractors, it was felt that from 1949's experience in the overall picture, the minimum age should be increased to 14 years. Some parents objected to the 12 and 13-year-old boys taking part in the driving tests. The observation was also made that the wider range in the age limits made it more difficult to present the type of instruction deemed advisable in this project.

Ten Tractor Clubs were organized in 1949 with a membership of 205, average age 16.5 years. The number of clubs in 1949 was limited to ten because it was felt that it would be advisable to gain a year's experience on a limited number

Contestants Leaving Tractor Lot—International Plowing Match, Brant County.

of clubs before getting into the project in a large way. Furthermore, the question of instructors available was a limiting factor as well. However, the project has proven of considerable interest to farm boys and no limitation has been set on the number of clubs for 1950.

This year Tractor Clubs must be organized by April 1st, as it is felt that these clubs should be under way at a time when spring work is starting on most farms. Meetings for club members will be held throughout the club year at which instruction will be given on operating maintenance and safety in the operation of the tractor. Each member must keep an accurate record on forms provided of the cost of operating and maintaining a farm tractor throughout the club season. Club members will be visited during the club season and notes made on the evidence of proper maintenance of the tractor. Each club shall hold an annual Achievement Day which will be arranged for by the Agricultural Representative, the Local Leader and the Sponsoring Committee. In some cases these Achievement Days in 1949 were held in connection with Plowing Matches, Fall Fairs or other local functions.

The Achievement Day will comprise an examination of 10 questions on safe, economical tractor operation, along with a driving and safety test with the tractor. All of these points mentioned are included in the final basis of awards. Prize money for the final standing based on the total score of points will be provided by the Ontario Department of Agriculture, and the local sponsoring organizations, such as Junior Farmer Associations, Agricultural Societies, Plowmen's Associations, etc. In 1950 it is planned to hold an Inter-Tractor Club Competition at the Ontario Agricultural College, along the lines of the inter-club competitions in other agricultural projects. This will be held about the third week in October.

It should be kept in mind that the Tractor Maintenance Club project is for the younger age group of farm boys who are driving tractors, and as such is based on the elementary principles of proper tractor maintenance, definitely not taking into consideration anything in the way of extensive overhaul work. Furthermore, in view of the large number of accidents across the province involving boys operating tractors, considerable attention is paid to safety in operation of the tractor. It is the intention of those in charge of these clubs to stress safe driving, safe operation of the tractor and farm machinery.

It is anticipated the Tractor Maintenance Club project will become one of the major agricultural projects for boys in club work in Ontario. Tractors have replaced horses to a very great extent on most of our Ontario farms, and consequently it is found that boys are more interested in the tractor project than they have been for several years in what was once quite popular, namely, the Foal Club project. Mechanization of agriculture had advanced rapidly in recent years, and the Tractor Club project is an attempt to provide for our boys on the farms a project which is useful and of interest to them.

Junior Farmer Farm Equipment Project

The Junior Farmers' Association of Ontario have been interested in a Farm Equipment project for the very same reasons as have been mentioned in discussing Tractor Maintenance Clubs.

Early in the summer of 1949, representatives of the Junior Farmers' Association of Ontario, the Ontario Department of Agriculture, the Ontario Retail Farm Equipment Dealers' Association, the Department of Public Safety, University of Toronto, and other interested agencies, got together and outlined what is known as the Junior Farmer Farm Equipment Project. The purpose of the project is:

1. To promote better selection of farm machinery.
2. To promote economical operation and maintenance of farm machinery.
3. To demonstrate proper safety in operation and driving of farm machinery.

The local Junior Farmers' Associations throughout the province conducted this project for their members. The various steps in the project were as follows:

1. A list of 30 questions, all pertaining to the selection, operation and safety of, and with farm machinery, were forwarded to all local Junior Farmer Clubs.

2. Contestants within the local clubs participated in an examination consisting of 15 of the above mentioned questions.

3. Under the auspices of the local Junior Farmer Club and in co-operation with the Agricultural Representative and the local Farm Equipment Dealers' Association, a driving competition was held, with a standard course suggested for all the competitions. The basis of awards for this local driving competition was 25 points for safe operating practices, 25 points for time, and 50 points for driving ability.

In view of the tremendous interest across the province on the part of Junior Farmers, it was quite evident that a final or Provincial Competition would be in order. Therefore plans were made to hold the finals for the province at the time of the annual convention of the Ontario Crop Improvement Association. This was held on January 19th, in the Coliseum at the Royal Winter Fair. A winner from each county in the province was eligible to compete. Thirty-two young men appeared for the Provincial Competition, representing over 600 contestants in 59 local competitions in 32 counties and districts throughout the province.

Naturally, the driving test in the Provincial Competition received the most attention and publicity. A very fine display of driving ability was demonstrated by the Junior Farmers taking part, but in addition to the driving test, each contestant had to participate in a defects test, in which he had to point out at least ten defects in evidence on a tractor put into such condition wherein defects could be readily ascertained by the Junior Farmers in the contest. The contestants also had to answer an examination of 20 questions pertaining to tractors, plows, binders and mowers as part of their contest. The 32 contestants went through the driving test, and the five with the highest total score on driving, defects tests, and examination, repeated the driving test through the same course, and the total score all round was used in making the final awards, which are as follows:

1. Donald Steckle, Essex County.
2. Howard Fawcett, Brant County.
3. Murray Cupples, York County.
4. Harvey Nurse, Halton County.
5. Donald McLean, Middlesex County.

This project proved of such great interest that plans are under way to develop a project in farm machinery to take in more work for 1950. One point which should be stressed in connection with both the Tractor Maintenance Clubs and the Junior Farmers' Project, is that while time in driving contests is to be considered, safety measures taken in driving is given more importance than the question of speed.

REPORT OF BRANT COUNTY LOCAL COMMITTEE INTERNATIONAL PLOWING MATCH, BURFORD

K. M. Armstrong, Brantford.

THE Brant Local Committee was set up as follows: Chairman, five Vice-Chairmen, Secretary, Treasurer, Assistant Treasurer, four Directors, two Advisory Directors (O.P.A. Director E. Moses), (O.P.A. Director W. C. Barrie).

The above made up the local Executive, and along with the chairmen of the following committees made up the local committee officers: Teams, Tractor, Lands, County Billetting, City Billetting, Parking, Publicity, Traffic, County Exhibits, Headquarters, Banquet, Reception, Lunch, Demonstrations, Horse Show, Historic, Special Funds, Health and Sanitation.

EXHIBIT AREA—(Headquarters)

General preparation of the area. This required the removing of fences and grading of fence bottoms, and adding fill for roadways, entrances, etc.

WATER SUPPLY

Capacity of pump supplied 650 gallons per hour; cost of wiring pump, $96.00; labour laying pipe, $104.50; number of taps, 10.

Suggestions regarding water:

While a considerable amount of aluminum pipe is owned by the O.P.A., this was of no use to local committee, as couplings were not available. At the last minute local firms were appealed to and came to our aid by supplying and laying iron pipe. In this regard the local committee is very grateful to Mr. J. A. Fellows of Brantford, whose untiring efforts resulted in a water supply upon very short notice. We would be amiss in not also mentioning the able assistance of Beatty Bros. of Fergus, who supplied the pump and installed same early in the summer so that it was possible to be sure of ample water supply and give health authorities the opportunity to test for sanitary conditions.

So far as pipe couplings, etc., are concerned, this is a matter for the O.P.A. and should have more and better attention well in advance of the match, as the number of taps or outlets for water were not ample. In the caterers' area, or where food is being served, taps should be not more than 100 feet apart, and in exhibit area not more than 300 feet apart, and at least two in the tractor parking area.

HEADQUARTERS BUILDING

This required flooring a portion of the building and making counters available, and also wiring the building for lighting purposes. Costs were as follows: Lumber and labour, $542.00; wiring, $100.00; rental office equipment, $45.00.

OTHER COSTS OF HEADQUARTERS

This includes stakes for lot boundaries, sawdust for filling water holes, direction cards, labour and trucks for removal of garbage, cleaning up the area after the match, and reimbursing farmers for damage done—Garbage removal, $1,175.00; sawdust, $146.00; labour, $100.00; cards, $91.00; stakes, $100.00; farmers, $2,500.00; liability insurance, $106.00.

SUGGESTIONS

Garbage removal costs were too high. This was left to local Department of Health. Would suggest to future local committees this be taken care of by a special committee or the Headquarters Committee.

In regard to cost of cleaning up farms and reimbursing for damage done, etc., rainy weather, of course, was responsibie for a considerable amount of this expenditure, as in the headquarters and parking area hay crops were destroyed.

Aerial View of Tented City and Match Area, Brant County.

Would suggest that more supervision over exhibitors and caterers be exercised and that regulations be put into effect by the O.P.A. whereby ground posts for electric power connections and other equipment placed underground be removed and the premises generally cleaned up as part of the contract for the exhibit space.

As local committee did not receive any revenue from the headquarters area for the total preparation of the field and expenses of garbage removal and cleaning up, this should be the responsibility of O.P.A.

Would also suggest that in future the main thoroughfare known as Implement Row and Street No. 2 be roped off or closed to motor traffic well in advance of the arrival of exhibitors and caterers, and when setting up the exhibitors' and caterers' booths, all displays and supplies be taken in at the rear of the exhibit. This would assure more pleasant conditions for those attending the match, particularly so if there is any rainy weather. Motor vehicles do tear up these streets and make it very unpleasant for those desiring to see exhibits.

LATRINES

The local committee did not have any effort in this connection, as the setting up and operating of the latrines was let as a concession, operator to supply all equipment and supplies, making a small charge per person. This did not prove satisfactory as it was not a profitable venture on the part of the operator and many attending the match were very dissatisfied.

Suggest that in future this be taken care of by the headquarters committee setting up and operating the latrines on a free basis. The latrines made available for: Men, 80; ladies, 80. Suggest quantity for men is satisfactory, but ladies' should be increased 100%.

TELEPHONES

Accommodation provided: 1 for O.P.A. headquarters, 1 for local committee, 3 pay stations in headquarters building. Cost for two 'phones, $63.00.

More pay stations placed at points throughout the exhibit area are necessary, as the exhibit area is so large that it does not give a reasonable accommodation to those attending the match to use telephones.

PUBLIC ADDRESS SYSTEM

This was used for paging persons called on the telephone. It was not satisfactory. The loud speakers were located close to headquarters only. Speakers should be located in the headquarters area, so that there would be complete coverage.

Would suggest that some money be spent on a public address system and contract let to responsible parties, also coverage checked in advance of the match, which would give better accommodation for all concerned.

LAND

Approximately two years in advance farmers were contacted and their farms signed up for the match. This should be done by all local committees, as it eliminates the possibility of some farms not becoming available.

Acres available	1,600
Sod	300
Stubble	200
Stakes used	7,500

Considerable difficulty was experienced, due to the extreme dry weather during 1949. In the spring seedings did not catch, which made it necessary to work up stubble fields and sow oats and rye for sod. The co-operation of two of the larger implement companies located in the area, using these fields for testing new equipment, resulted in a very substantial saving to the local committee. It was also necessary to do considerable cutting of weeds on stubble fields.

Cost of preparing plowing fields:

Seed—Oats and rye	$697.00
Cutting weeds	612.00
Scratching fields	75.00
7,500 stakes	275.00

TRACTION COMMITTEE

This committee is very grateful for the co-operation of representatives of the farm equipment companies in locating tractors.

Number of tractors supplied	405
Number of applications (standard tractors)	360
Number of applications (row crop tractors)	20
Highest number used one day	310
Number of competitors who brought in own tractors	50
Cost of transporting tractors in and out	$6,150.00
Cost of insurance on tractors	247.50

Rainy weather caused the postponement of events on one day of the match. This resulted in our having a surplus of tractors over applications, as some contestants did not stay.

A fee of $5.00 was asked with each application, refunded when entry fee was made and land drawn. It was necessary to return only ten (10) deposits to applicants who submitted good reasons for not being present to plow. We strongly recommend this practice be continued, as it assures genuine applications.

Many compliments were received from contestants on the way tractors were allotted. Tractors were all labelled with serial numbers. Each type and make of tractor had a separate space in the parking area. The drawing for lands the previous evening was of great assistance and the tractor committee strongly recommends this practice be continued.

We also recommend that steps be taken by the O.P.A. to reduce the number of tractor entries. The matter of supplying tractors is a problem for the local committee, both in the locating of tractors and the financing of transportation. Very few complaints were received from lost articles from tractors. This was accomplished by making a complete record of all the accessories, etc., on the tractors as they came in and by having a caretaker in charge nightly on the parking lot.

TEAMS

Number of teams available	82
Cost of bringing in teams	$ 566.00
Cost of billetting teams	1,640.00
Insurance on teams and harness	41.25

The cost of billetting teams was rather high. This was due to farmers being short of feed in the area. Because of the dry season feed had to be purchased and brought in. Locating good plow teams is becoming a problem. Contestants in these classes should be encouraged to bring their own teams.

HORSE SHOEING COMPETITION

Number of forges provided	6
Cost—Trucking only.	
Material provided—Nails, iron, etc.—cost of material	$45.00

It is the suggestion of the local committee that the horse-shoeing competition be eliminated from future events. They do not add any attraction to the demonstrations. Contestants are not very numerous and those partaking prefer clowning to giving a good demonstration. Suggest efforts be directed to other contests, which are more interesting and instructive to spectators.

LUNCHES

Number of lunches furnished	1,560
Cost per lunch	$0.65

Number of lunches sold to helpers and others (no data available; as concessionaires sold lunches it was impossible to obtain the quantity sold).

The contents of the lunch container to each plowman included four sandwiches, one piece of cake, half pint chocolate milk, and a chocolate bar. This was very satisfying.

The containers for supplying the lunches were supplied by a local firm who did this for the advertising value.

SUGGESTIONS

Catering for the lunches should be done by one organization only who have no other service. Better lunches will be provided.

COUNTY EXHIBITS

Two tents, 60 x 100 and 40 x 60, displayed livestock, poultry, dairy produce, vegetables, grain, Indian display, items of historic interest, home crafts, etc.

Cost to the local committee	$1,000.00
Insurance on livestock	30.00

The county exhibit was a very desirable feature and created considerable attention. Livestock and historical items are always interesting. The Indian village was unique. Thanks to Elliott Moses for his part in organizing this display.

PARKING

Number of paid staff, 70—$2,364.00; number of police, 15; cost of police, nil—Ontario Provincial Police; approximate number of cars, 50,000; number of acres available for parking, 200; acres used for parking, 100.

TICKET BOOTHS

Five ticket booths—cost of $155.00.

The men employed for the sale and taking of tickets and operating parking areas were farmers from the locality, and five bank tellers. The latter took the cash in the ticket booths located at the five points of entrance.

For convenience of ticket sellers and takers a different colour of ticket was used daily. The revenue from the match was obtained on the following basis: 25c per person, 25c per car.

SUGGESTIONS

In view of the enormous increase in expenditures on the part of the local committee, the matter of issuing windshield stickers, complimentary and exhibitor passes, etc., should be reviewed with the idea in mind to reduce to a minimum free admissions.

These passes are a very great inconvenience to ticket sellers and takers and cause many arguments.

It is also recommended that under no circumstances should any firm or organization be permitted to print and issue passes to members of their own organization.

TRAFFIC

Recommendations: The committee should request not less than 50 Provincial Police. All roads leading into the area should be closely surveyed and plans made that in case of a traffic tie-up on any one road that an alternative route be available to relieve congestion.

There must be the closest co-operation between the Traffic Committee and the county and city and Provincial Police.

Provincial Police should be on duty at 8.00 a.m. daily.

Care should also be exercised that there be no persons allowed to sell any merchandise or any organizations allowed to sell tickets of any kind on the roads, as traffic must be kept moving as freely as possible at all times.

DEMONSTRATIONS

Demonstrations arranged: Horse shoeing contest, sheep dog demonstration, oxen plowing, tractor rodeo, horse show, fire fighting, demonstrations by manufacturers of farm equipment, horse shoe pitching, crop improvement, contour plowing.

Demonstrations are guided, to a great extent, by conditions which exist in the area in which the match is held.

Total cost of demonstrations, $200.00.

The committee would like, in particular, to pay tribute to the Fire Marshall's Department for the very able demonstrations on fire fighting. These were not only interesting but also very instructive.

PUBLICITY AND ADVERTISING

The prize list and annual programme should be out at least six weeks prior to the opening of the match. This is a must, as this coming out at the time it did this year caused the local committee a considerable amount of inconvenience.

There should be greater newspaper coverage in advance of the match, also radio spots. Better road directions in district should be erected well in advance of the match.

BANQUET

Number in attendance, 1,100.

Cost of banquet—$1.35 per plate.

Number catering—one organization.

The Brant Junior Farmers catered for the banquet, supplying good food with prompt service. Suggest, if possible, catering for the banquet should be by one organization only.

The Boys' Band and Girls' Choir from Brantford graciously supplied the entertainment to the pleasure of the assembled group.

BILLETTING

Total available in the county, 2,600.

City of Brantford, 2,200.

Charge: $3.50 double room, $2.50 single room.

Total directed to billets, not over 500.

Publicity given by the press, etc., on matches held previously, requiring necessity of billets, caused disappointment on the part of many who made billets available, in that they were not taken up.

Considerable criticism has been directed both at the O.P.A. and the local committee. It was quite apparent that many attending previous matches, who had not been taken care of, made provisions to stay outside of the area. Suggest that less publicity regarding billets to be used, particularly when the match is being held in a central location.

OTHER SUGGESTIONS OF THE LOCAL COMMITTEE

That there be better co-relation between the O.P.A. and the local committee exercised, in that there will be a better understanding as to the duties of the two groups. That a revised or up-to-date list of the duties and obligations of each group be compiled and made available to all local committees entertaining the idea of sponsoring the match.

In view of the tremendous growth and expansion of this outstanding event and the increased duties and obligation on the part of the local committee, we suggest that the directors of the O.P.A. review the whole situation with the idea of assuming more responsibility in the preparation and the operation of the International Plowing Match.

In closing, I wish to take this opportunity of expressing, on behalf of the citizens of Brant County and the City of Brantford, our sincere appreciation for the privilege and honour of staging, in 1949, the greatest International Plowing Match.

We extend thanks for the co-operation and assistance received from the officers and directors of the Ontario Plowmen's Association.

Mr. President, it gives me a great deal of pleasure to submit this report.

PLOWMEN'S TRIP TO BRITAIN

ELLIOTT MOSES, Brantford.

BEFORE attempting to give you some of the highlights of our trip overseas I desire to express, on behalf of the boys and myself, our sincere appreciation to the Salada Tea Co. Ltd. and Imperial Oil Ltd. for sponsoring such a delightfully interesting and educative trip.

I presume that when these trips were first sponsored little or no thought was given to the splendid social spirit that would, and has now been developed, between our Canadian plowmen and farmers and the people of the old land. I am quite sure that all who have been privileged to take these trips have now a much better understanding of the people of Britain, and their many problems, and due to this knowledge have a much more kindly feeling towards them. After seeing and learning of all they have endured because of the past two great wars and the restricted conditions under which they now live, one could have nothing but the highest praise for them.

There was nothing extraordinary about our train trip from Toronto to New York, however; we were all thrilled to see the great city for the first time, and I

think much more thrilled and impressed with the thought of our first trip across the great Atlantic in a new ship called the Caronia, the largest passenger ship made in the British Empire since the end of the war. It was making its return maiden trip to England.

After an overnight stay in New York we boarded the Caronia to start the journey which we had looked forward to with great anticipation.

Our first mission was to inspect the great ship from top to bottom, and we were amazed at the ingenuity which enters into the making of one of these ships. In brief, I would compare them in so far as comforts and conveniences are concerned, to the most modern hotels in the land, and to enjoy these comforts and conveniences all one had to do was to be a good sailor. Three of our party qualified highly in this respect, but strange to say, our best plowmen, Alvin Mark and Rhys Bacher, took to their beds for the greater part of the journey, and I am wondering now if they were just fooling and were simply resting up for the big struggle on reaching the British Isles. One thing about the whole affair, they missed many good meals such as are served on ship.

After a six-day ride on the waves of the Atlantic we landed at Southampton and viewed old England from this point for the first time and were most impressed with thousands of chimneys extending from the roofs of the houses which we afterwards learned carried down into the houses to huge fireplaces, the only means of heat in a great many British homes as compared to what we know here in Canada as central heating. We were not long there before we learned the real difference in the two systems. While the temperature was not low we were unabie to keep warm.

We then took the train to London and viewed the countryside as we went along. It was all so new and different to ours. Finally we pulled into a sort of huge open air station and then began to learn something of the Old Country's way of doing things which, in some respects is the very reverse to our own, especially when it came to the matter of transportation by car and bus. The Englishman sits on the wrong side of his car, and worse yet, drives on the wrong side of the street. This struck me so forceably that I found myself trying to meet people in the hotel corridors in the same manner. However, it was a case of live and learn, and I was by far the poorest student in this respect.

After spending Saturday night and part of Sunday in London we boarded the train for Newquay, a very beautiful spot in the Cornwall area, and after travelling a little over half a day we landed at our destination and were welcomed by the entire board of the West England Plowmen's Association. From that time on we began to learn of the hospitality of the farm folk of the old land, which greatly exceeded our expectations.

After becoming somewhat acquainted we were taken to a beautiful summer hotel on the outskirts of the city which, by the way, was the home of some of our Canadian air men during the war. We naturally were quite proud to think that we should follow after them for somewhat the same mission, with the exception that theirs was one of courage, while ours was very much of a social mission. The

hotel was the property of this year's president of the West England Plowmen's Association (Mr. Johnson), and after the usual English cup of tea and a light lunch we spent a couple of hours in conversation with our new friends, and then retired for the night.

The boys, being farmers, were up in good time the next morning, and after a breakfast of real bacon and eggs brought in from the farms, they were off for a day's practice in a nearby field. You will be interested to know that the place of practice was kept a secret, and we felt most important on reaching there to find uniformed policemen guarding the main entrances to the field and only officials being allowed to enter. The object of this procedure was to prevent the Old Country plowmen from learning some of the Canadian boys' secret methods of good plowing as well as to prevent our boys from being disturbed by crowds of people. This and the fact that on our return trip on the Queen Mary, through the kindness of one of the ship stewards, we had a select position in the huge line of people wishing to disembark, we were loudly proclaimed as Canadian diplomats. This added much to the importance of our lives, at least for the time being.

The next morning we were off to take part in our first competition, and it was interesting to see the great crowds of plowmen and people slowly making their way down the narrow hedged roads to see these Canadians in action. We were told that while in other years the Association, at a half crown per person, would take in about $200.00 in our currency due to our presence, they realized the great sum of $2,000.00 (Canadian money).

The plow field was the finest we had ever seen. It was about as level as a floor and there was actually no choice of land from one end to the other. The board of directors were very considerate. On learning that our plows differed much to theirs, they had arranged a special class for us to plow in. After we had checked on the great variety of plows being unloaded we could see that we were to be in a class by ourselves as to the type of plowing that would be done. However, after the match was over, Alvin Mark had captured first prize in this special class, and the judge, in commenting on the work of the Canadian boys, remarked that they knew the shortest way across the field; in other words, had the straightest furrows. I was proud of this our first attempt against the Old Country plowmen, of which there were about eight in the class.

Our first match now over, we spent the next day or two touring the beautiful countryside and for the first time saw a few of their most up-to-date farms. We were impressed with the thoroughness of the Old Country farmers in their work and concluded that in a country like Britain it was very necessary to make every move count. There seemingly was no wasting of land. In other words, it appeared that they were getting the most out of everything they did.

The livestock were of the very best of the breeds being raised. This also applied to the garin, or corn as they call it. What we saw was of excellent quality and yielded from 70 to 85 bushels per acre.

The time had now come when we must leave these very fine and friendly people, and we found our way back to Newquay accompanied by fifty people, men,

women and children, who gave us a farewell that we will not soon forget. We were then on our way to London and Workington, an all night and day trip, except for a short stop-off in London on the way through. We finally reached Workington about 9.20 p.m. and were taken direct to our hotel, where a dinner had been arranged in our honour by the mayor of the city and the board of directors of the Empire Plowmen's Association. After making the acquaintance of our new friends we retired for the night. The next morning the boys were to enter their next competition without the advantage of any practice day.

The Canadian plowmen of the year previous had plowed at this same match and there did not appear to be the same interest being taken in our boys as compared to Cornwall. However, they were most kind and considerate, even to the extent of arranging a special class for our boys. This was designated as a commercial class and would correspond with what we call a utility class in Ontario.

The field was a most uneven one and had a ridge running across it so that one could not see the far end of his lot. In order to be sure of a straight strike the Old Country plowmen stretched a binder twine cord from one end of the field to the other and followed this through with the plow, and thereby in most cases had perfect strikes.

Alvin Mark and Wilburt McFadden entered the commercial class with about six other contestants, with the result that Alvin was awarded first prize and Wilburt third. The tractor boys plowed in one of the regular classes on a very long, sloping field. The competition was keen and as they were attempting to master the new Massey tractor, a very bulky machine, they did not come within the prizes.

The next day was given over to a tour of what is known as the lake district, a very lovely spot in this Cumberland area, dotted with many little lakes, great hills and valleys, and said by the Archbishop of Canterbury to be one of the beauty spots of the world.

This district is kept in its natural state and people are not allowed to develop it into cheap summer resorts, as so often has been done in our own Ontario. However, it probably is not too late for us to take a lesson from our English people and thereby save some of our beauty spots for people who really love nature.

This pleasant tour, having ended, we visited the neighbouring factories and schools of Workington, which were all very interesting. I would like to comment briefly on the schools visited. Some were ordinary day schools, while others were separate schools for boys and girls.

We were pleasantly surprised to find the English children looking so fit, and in commenting on this point, we were advised that every child received a lunch and a glass of milk each day regardless of the fact that in some cases they weren't able to pay for it. Many Britishers gave their lives in the war and one can see the wisdom of the English in giving their children special consideration in the way of food to make them better fitted, physically, mentally and morally, to fill in this gap of shortage of a certain age of manhood.

The following day we left for Edinburgh, Scotland, and were taken in hand by Mr. Johns of the Edinburgh Board of Trade, who took us on an extensive tour of interesting, historical spots throughout the city. We were most impressed with seeing Edinburgh Castle which, we were informed, was built during the time when the savage English were attempting to overrun Scotland. Time and space will not permit describing our tour in detail. However, one visiting Scotland should not miss seeing the Edinburgh Castle. Such sights are not common.

From here we were taken to the City of Glasgow, and from that point made a tour of the west central highlands, including the home of Bobby Burns, and many other points of interest. Our group, all having a country background, were impressed with the appearance of the country side in this part of Scotland. It is of a mountainous nature and the numerous reforestation areas on the mountain sides were most pleasing to view. We finally reached the height of land in the little cars in which we were travelling. They seemingly had no difficulty in climbing the mountain roads. We turned back to Glasgow for the night and then to Edinburgh the next day to see a rugby game between Scotland and Wales to decide the championship of the British Isles. The Welsh were picked as favourites to win, but lost this important game by only two points.

We returned to Glasgow for dinner and that evening took the train to Stranrar, and from that point the boat to Larne, across the Irish sea, then direct to Belfast. Here we were greeted by our good friend Peter Fitzpatrick and the president of the Irish plowmen, and many others. The next morning we set out for a place called Port Stewart, where we were billeted in a beautiful summer hotel engaged for plowmen, their families and friends from all parts of Britain, including England, Scotland, South Ireland and the Isle of Man. As one listened to what I would term their tribal tongue, one might have concluded that he was attending a League of Nations meeting rather than a champion plowmen's event.

After dinner we retired to one of the lounges and became better acquainted and then enjoyed listening to real Irish wit and humour, and being half Irish I was delighted to meet such a group who I am told are always of the same jovial nature.

The next day proved to be the first real wet day during our month's stay in the Old Land. The day had been set aside for practice, and in spite of the rain which continued to fall, a couple of bus loads of plowmen went on a ten-mile ride to limber up for the match the next day.

Unfortunately, it continued to rain up until 9 a.m. the day of the match. By this time the plowing field had become a quagmire and cars were being pulled through by caterpillar tractors, etc. These conditions did not, however, appear to dampen the spirits of the plowmen and visiting public who were wading through mud ankle deep in most cases, with low shoes and no rubbers.

These conditions did, however, interfere very much with the success of what would have been the most important match of all had the weather been favourable. It was the championship match of Britain.

Our boys in the horse classes, previous to landing there, had been entered in what may in our country be termed a highcut class and would be a medium class with them. Having to plow in such a class with our jointer plows and keeping in mind that their judges have an entirely different system of scoring, left little hope that our boys would score very high. However, the Canadian boys' presence at the match attracted a great deal of attention, and one of Peter Fitzpatrick's big jobs was to keep the public away from our boys.

The next day was given over to a tour of the sea shore of North Ireland. The green grass on the hills and mountains and the deep valleys was a sight we will always remember, and we now understand what is meant by Irish green.

Our next big event was the annual dinner of the Irish match, at which approximately 200 people attended. A full course dinner was served and after the usual speech making and the presentation of prizes, we retired to the dance floor, and for the first time our boys indulged in the Irish jig and other kinds of folk dances which really were a lot of fun. This went on until the wee hours of the morning and after having a few winks of sleep we arose, had a bite to eat and were taken on a tour inland, to see some of the good Irish farms. These were very much of the same class of farms we saw in England and Scotland, and here again we were impressed with the thoroughness of the Irish farmer in his work.

We also visited a government-owned and operated creamery, a hemp factory, a seed cleaning plant and an agricultural college that had recently opened.

This brought to an end our very pleasant stay with the people of North Ireland. We returned to Larne accompanied by our good friend Peter Fitzpatrick, who was so kind and considerate, and like ourselves hated to say good-bye. We crossed the Irish Sea again during the night and eventually landed back in old London for a day or two more of sightseeing, and finally after a farewell dinner we turned our thoughts homeward and were soon aboard the Queen Mary bound for the U.S. and Canada.

Let me say, in conclusion, that while we found the people of Britain passing through strenuous times with a shortage of dollars and food restrictions more exacting than in war years, and with all sorts of other restrictions governing their lives, we heard murmuring but all seemed determined to carry through in order that they may regain the security which as a nation they have enjoyed in days gone by. The hospitality extended to us at all times far exceeded our expectations and one wonders what must have been their standard in this respect in normal times. We left our Canada with little or no thought of her greatness simply because we had always so naturally enjoyed all that is ours. After a stay of one month in Britain and seeing and learning their way of life which is not of their own choosing but forced upon them by world conditions over which they had little or no control, we return home thankful for all that is ours and at the same time with a deep sense of sympathy for those of the Old Land.

REPORT OF RESOLUTIONS COMMITTEE

ELLIOTT MOSES, Ohsweken,, Chairman.

1. Be it resolved that the thanks of this Association be tendered to Col. The Hon. Thomas L. Kennedy, Prime Minister of Ontario and Minister of Agriculture, and his staff, for their hearty and continued support of the work of this Association and its branches.

2. Be it resolved that the thanks of this organization be tendered to the Imperial Oil Co. Ltd., Salada Tea Co., Beatty Bros. Ltd., and all other firms and individuals who have contributed their support, financially and otherwise, to the Ontario Plowmen's Association in 1949.

3. Be it resolved that the Ontario Plowmen's Association express its appreciation to the daily, weekly and farm press, to radio commentators and stations for their support and publicity during the year.

4. Be it resolved that the Family Herald and Weekly Star be commended and thanked for providing, printing and distributing daily programmes during the match.

5. Be it resolved that this Association express appreciation for the assistance given it and its branches during the year by the Ontario Department of Agriculture, and especially the Agricultural Representatives Branch.

6. Be it resolved that local branches be encouraged to conduct home plowing competitions, junior matches and classes for juniors at branch matches, educational programmes and provide stimulus and support to all farm organizations conducting programmes for the benefit of Ontario farm youth.

7. Be it resolved that this Association express its thanks to Dr. H. J. Barre, Mr. F. S. Thomas and others who have contributed to the programme of this annual convention.

8. Be it resolved that thanks be tendered delegations who have presented invitations at this annual meeting to conduct International Plowing Matches in their respective counties.

9. Be it resolved that this Association express its thanks to the Hydro-Electric Power Commission, Provincial Police, Health Department and the Fire Marshals Department, for their splendid co-operation in their respective fields of work in connection with the International Plowing Match.

10. Be it resolved that this Association urge the Branches of the Ontario Plowmen's Association to give serious thought and encouragement to all programmes of conservation in the counties which they represent.

Ontario Department of Agriculture

ANNUAL REPORT

OF THE

STATISTICS BRANCH

1949

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ONTARIO

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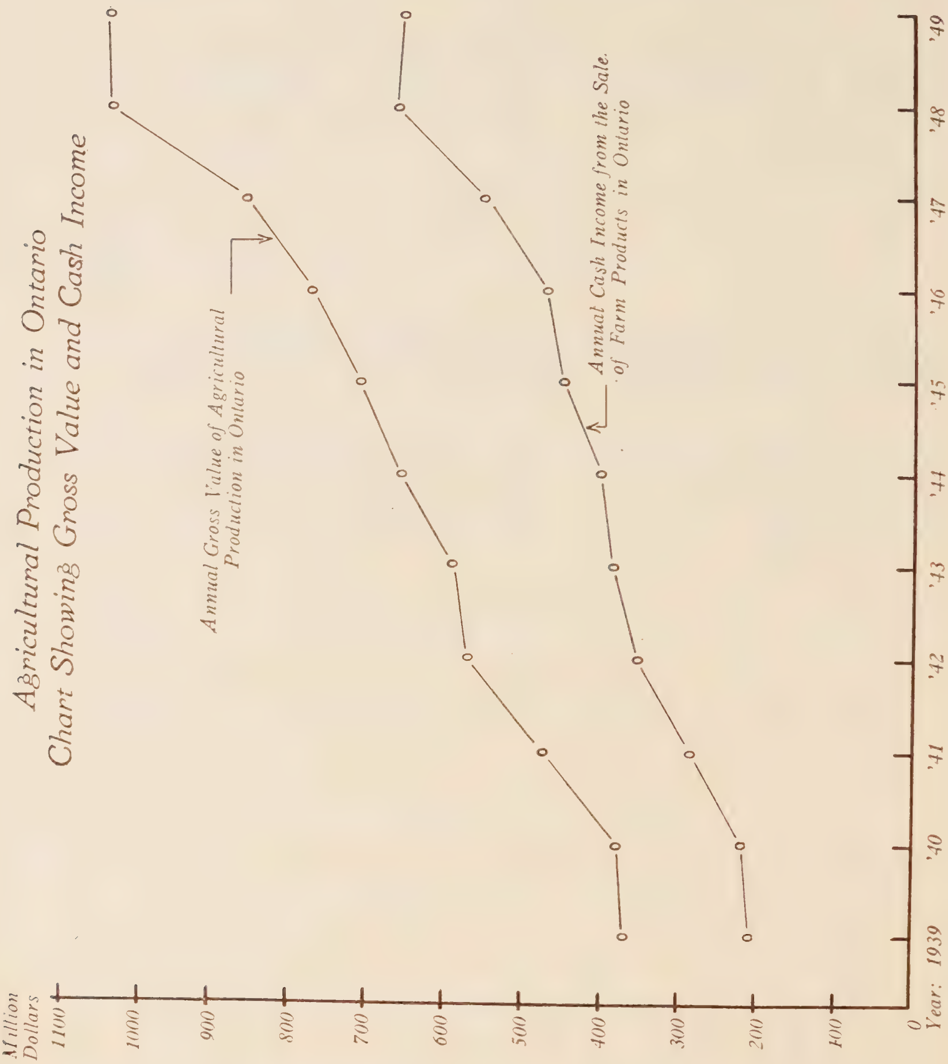
1950

INDEX

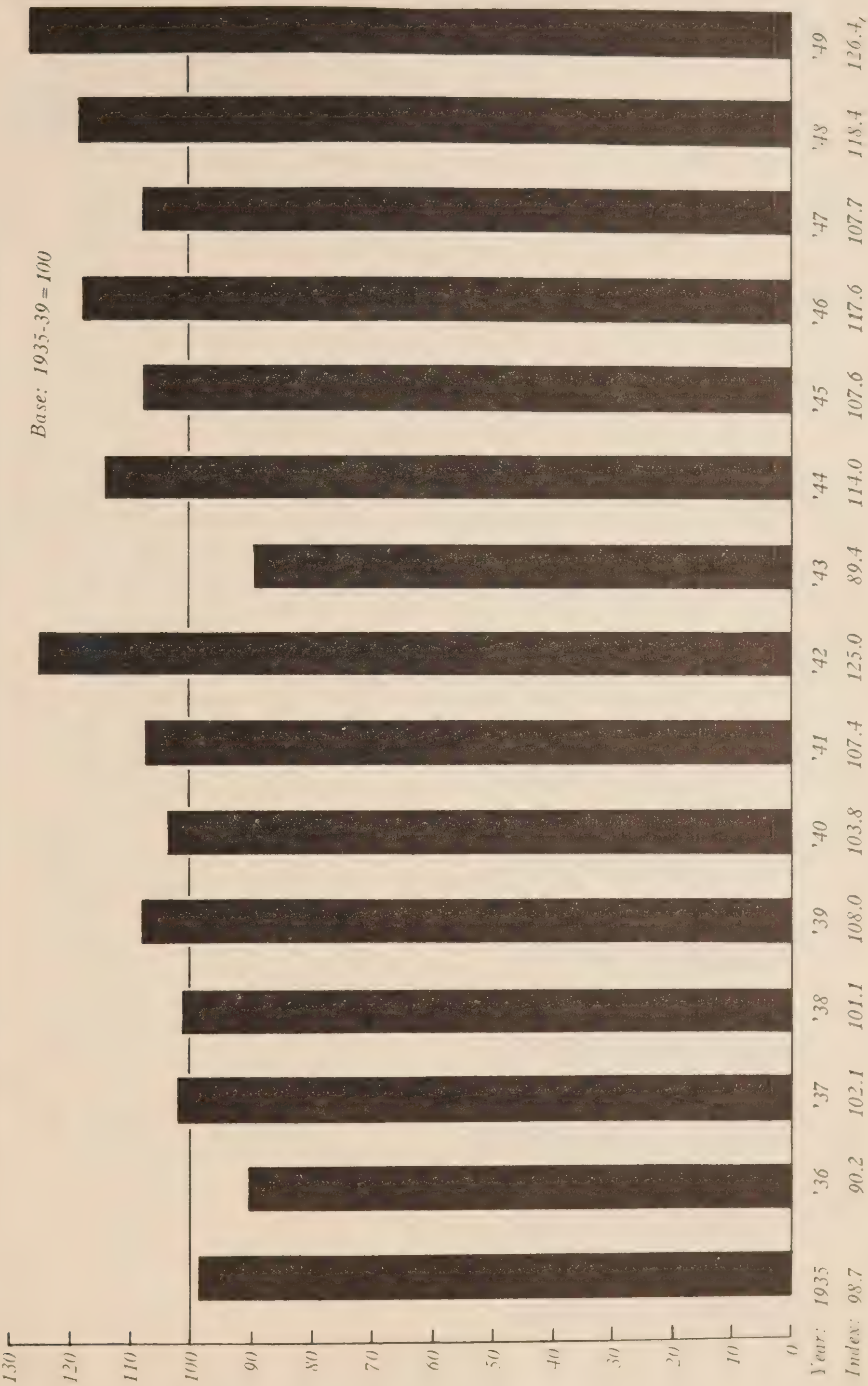
GROSS VALUE OF AGRICULTURAL PRODUCTION IN ONTARIO, YEARS 1948–1949

	Unit	Revised Estimate—Year 1948			Preliminary Estimate for 1949		
		Production	Value $000	Total Value $000	Production	Value $000	Total Value $000
Fall Wheat	bu.	26,013,000	53,847		24,714,000	42,755	
Spring Wheat	"	1,161,000	2,403		1,062,000	1,837	
Oats	"	76,728,000	62,917		71,967,000	56,134	
Barley	"	7,778,000	8,634		6,908,000	8,082	
Fall Rye	"	2,751,000	4,182		2,226,000	2,960	
Peas, dry	"	650,000	1,859		391,000	966	
Beans, dry	"	1,402,000	5,762		1,578,000	5,239	
Soybeans	"	1,824,000	4,195		2,605,000	5,887	
Buckwheat	"	1,843,000	2,119		1,509,000	1,766	
Mixed Grains	"	47,672,000	45,288		42,748,000	39,328	
Flaxseed	"	829,000	3,150		196,000	647	
Shelled Corn	"	12,120,000	15,998		13,100,000	16,244	
Potatoes	"	20,370,000	24,077		18,720,000	21,341	
Turnips, Mangels, etc.	"	19,514,000	8,586		14,836,000	8,160	
Hay and Clover	tons	5,750,000	82,800		3,689,000	72,304	
Alfalfa	"	1,823,000	29,168		1,428,000	31,416	
Fodder Corn	"	3,996,000	21,099		4,180,000	24,244	
Sugar Beets	"	197,000	2,817	378,901	335,400	4,630	343,940
Cattle—Sold off farms	No.	667,986	106,914		715,124	115,559	
Income in kind	"	46,300	5,563		38,800	5,018	
Calves—Sold off farms	"	394,810	15,403		381,047	17,517	
Income in kind	"	18,900	689		16,800	696	
Change in inventory (cattle and calves)	"	−123,500	−14,356		+4,200	+783	
Sheep and Lambs—Sold off farms	"	248,037	3,622		269,897	4,365	
Income in kind	"	9,000	162		7,000	151	
Change in inventory	"	−44,600	−768		−25,900	−477	
Hogs—Sold off farms	"	2,577,494	124,069		3,038,942	150,649	
Income in kind	"	299,400	13,027		170,500	7,596	
Change in inventory	"	−168,000	−6,111		+262,400	+7,445	
Horses—Sold off farms	"	....	....		....	....	
Change in inventory	"	−31,800	−2,776	245,438	−29,500	−2,150	307,152
Wool—Sold off farms	lb.	2,166,562	650		1,935,007	586	
Used on farms	"	14,438	4	654	12,993	4	590

Butter—Sold off farms	lb.	84,607,000	44,692		81,916,000	37,081	
Used on farms	"		6,788			4,595	
Cheese—Sold off farms	"	70,160,000	20,834		85,138,000	22,648	
Used on farms	"	154,000	42		152,000	38	
Milk and other Milk Products—Sold off farms	"	2,138,348,000	74,396		2,107,235,000	67,978	
Used on farms—							
(Farm-home consumed)	"	487,900,000	13,759		523,200,000	12,504	
(Fed to livestock)	"	180,100,000	5,079	165,590	196,800,000	4,704	149,548
Fruits—Sold off farms	....	....	15,135		....	13,350	
Income in kind	....	....	5,906		....	5,706	
Vegetables—Sold off farms	....	....	36,794		....	29,726	
Income in kind	....	....	7,027		....	6,761	
Floriculture—Sold off farms	....	....	2,445		....	2,445	
Nursery Stock—Sold off farms	....	....	205		....	321	
Greenhouse Products—Income in kind	....	....	957	68,469	....	920	59,229
Poultry and Eggs—Sold off farms	....	....	84,534		....	82,397	
Consumed on farms	....	....	12,253		....	12,566	
Change in poultry inventory	No.	−7,435,000	−16,322	80,465	+1,251,000	+2,659	97,622
Fur Farming	....	....	2,208	2,208	....	1,973	1,973
Maple Products—Sold off farms	gal.	254,345	999		262,080	1,043	
Used on farms	"	136,955	538	1,537	141,120	562	1,605
Tobacco	lb.	112,857,000	48,544	48,544	127,981,000	55,592	55,592
Fibre Flax	....	....	263	263	....	135	135
Clover and Grass Seed	lb.	16,577,000	4,286	4,286	8,572,000	2,372	2,372
Honey and Wax—Sold off farms	"	15,592,500	2,870		10,469,200	1,717	
Used on farms	"	379,500	68	2,938	345,800	55	1,772
Forest Products—Sold off farms	....	....	11,959		....	12,089	
Used on farms	....	....	17,952	29,911	....	18,098	30,187
GRAND TOTAL	....	....	....	1,029,204	....	....	1,051,717


Agricultural Production in Ontario
Chart Showing Gross Value and Cash Income
Annual Gross Value of Agricultural Production in Ontario
Annual Cash Income from the Sale of Farm Products in Ontario
Million Dollars
1100
1000
900
800
700
600
500
400
300
200
100
0
Year: 1939
'40
'41
'42
'43
'44
'45
'46
'47
'48
'49

Index of Physical Volume of Agricultural Production in Ontario

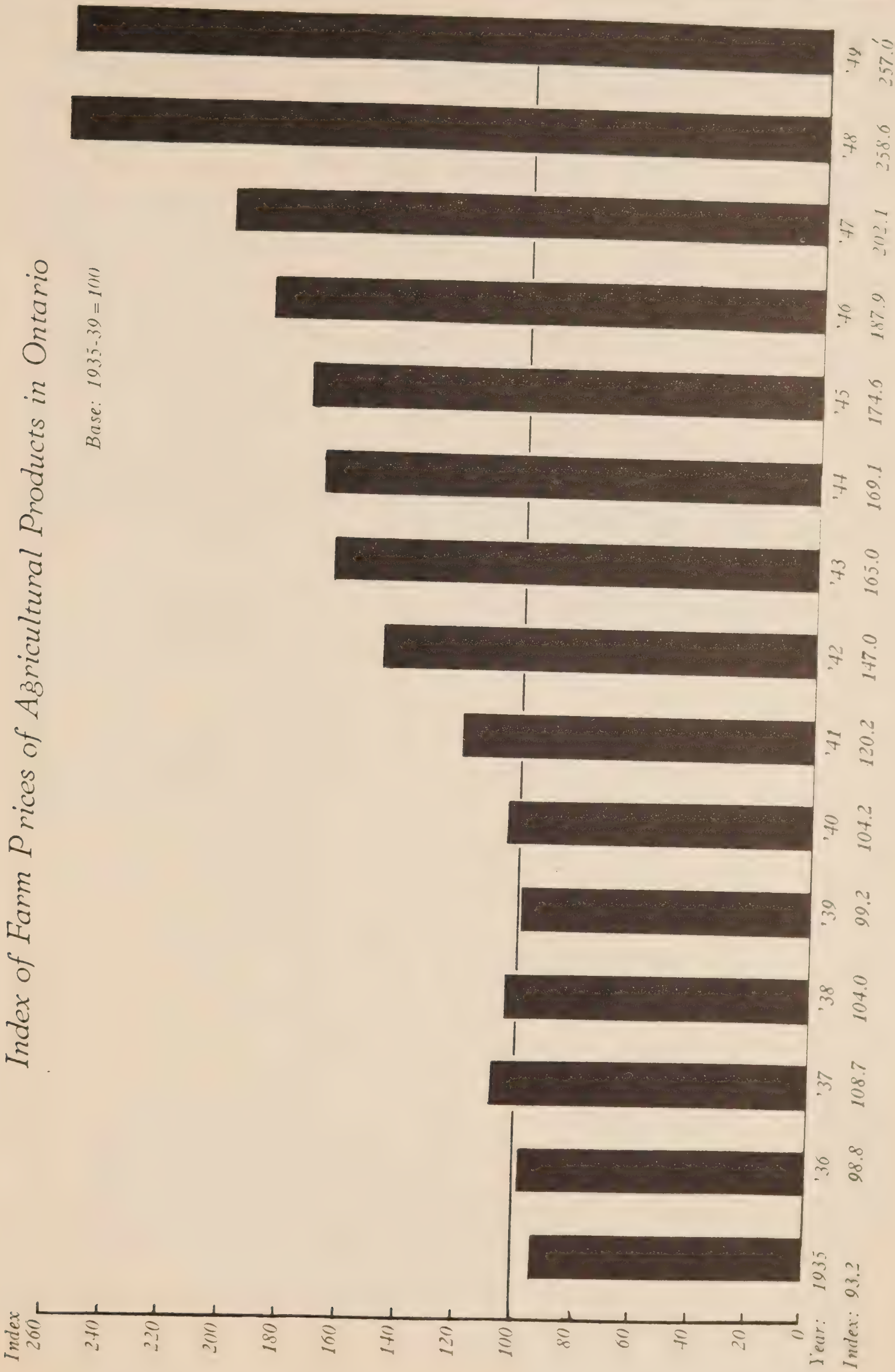


INDEX NUMBERS OF FARM PRICES OF AGRICULTURE PRODUCTS, ONTARIO 1935 TO DATE

(1935–39 = 100)

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Average
1935	90.4	91.6	93.1	92.6	93.7	93.6	91.2	91.3	93.9	94.9	95.1	97.2	93.2
1936	97.8	96.6	95.3	92.4	91.7	95.2	98.0	103.7	105.1	101.5	103.5	104.3	98.8
1937	107.2	106.6	106.2	109.1	108.7	108.2	112.4	112.3	110.1	109.7	107.2	106.6	108.7
1938	105.2	106.3	110.0	109.6	103.3	105.4	108.4	102.6	101.0	99.7	98.0	98.4	104.0
1939	97.2	97.2	98.3	96.7	95.1	95.7	96.7	94.1	101.9	104.0	106.5	107.4	99.2
1940	106.6	107.2	106.7	104.3	101.2	100.4	101.0	100.4	103.3	104.1	107.7	108.2	104.2
1941	107.1	107.2	108.7	109.3	112.4	115.9	123.3	128.2	130.0	130.0	135.2	135.0	120.2
1942	138.0	139.4	142.8	141.2	140.3	150.4	153.5	147.4	146.7	151.7	155.7	157.4	147.0
1943	158.5	159.4	161.1	160.8	160.5	162.7	164.6	167.5	166.5	170.8	174.0	174.2	165.0
1944	172.7	173.3	173.0	170.7	165.2	165.0	168.1	167.4	166.8	167.6	169.1	170.3	169.1
1945	169.6	170.7	171.6	172.2	172.4	174.1	174.7	177.3	177.2	175.9	179.7	179.7	174.6
1946	181.3	183.1	182.8	185.0	187.9	190.7	192.4	191.2	189.6	190.0	190.5	190.4	187.9
1947	190.0	189.8	192.3	191.0	194.9	202.2	202.8	206.0	208.7	210.3	213.5	223.9	202.1
1948	239.2	240.8	239.8	242.1	246.3	264.9	263.5	278.1	273.8	273.8	270.7	270.2	258.6
1949	266.1	258.9	254.0	253.5	251.4	260.9	261.8	259.1	256.8	255.1	252.3	254.2	257.0
1950	242.7	248.8	252.6	255.2	....	....	....	....	....	....	....	....	....

Note.—This index is based on prices of grains, live stock, milk, poultry and eggs, fruits and vegetables, sugar beets and tobacco.


Index of Farm Prices of Agricultural Products in Ontario
Base: 1935-39 = 100
Index
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Year: 1935 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49
Index: 93.2 98.8 108.7 104.0 99.2 104.2 120.2 147.0 165.0 169.1 174.6 187.9 202.1 258.6 257.0

PRODUCTION AND VALUE OF POULTRY AND EGGS IN ONTARIO, YEARS 1947-48-49

	1947			1948			1949		
	Sold off Farms	Farm-home Consumed	Total	Sold off Farms	Farm-home Consumed	Total	Sold off Farms	Farm-home Consumed	Total
Eggs—									
Hatching . . . . Doz.	5,095,000	427,000	5,522,000	3,726,900	452,500	4,179,400	3,251,200	175,800	3,427,000
Value . . . . $	2,355,000	170,000	2,525,000	2,018,500	211,800	2,230,300	1,835,000	84,500	1,919,500
Other Eggs . . . . Doz.	131,583,000	17,057,000	148,640,000	121,731,700	15,498,700	137,230,400	99,224,000	14,133,000	113,357,000
Value . . . . $	49,300,000	6,211,000	55,511,000	54,982,400	6,895,400	61,877,800	42,838,000	6,008,000	48,846,000
Fowl and Chickens . . . . Lb.	79,634,000	16,466,000	96,100,000	71,616,000	13,236,000	84,852,000	96,064,000	16,545,000	112,609,000
Value . . . . $	20,758,000	5,220,000	25,978,000	21,673,000	4,842,000	26,515,000	31,639,000	6,187,000	37,826,000
Turkeys . . . . Lb.	8,458,000	541,000	8,999,000	9,686,000	287,000	9,973,000	9,610,000	226,000	9,836,000
Value . . . . $	3,767,000	244,000	4,011,000	4,966,000	150,000	5,116,000	4,872,000	116,000	4,988,000
Geese . . . . Lb.	2,120,000	313,000	2,433,000	1,746,000	246,000	1,992,000	1,545,000	142,000	1,687,000
Value . . . . $	830,000	135,000	965,000	764,000	120,000	884,000	669,000	64,000	733,000
Ducks . . . . Lb.	440,000	84,000	524,000	430,000	108,000	538,000	1,453,000	243,000	1,696,000
Value . . . . $	118,000	20,000	138,000	130,000	34,000	164,000	544,000	106,000	650,000
Change in Inventory . . . . $	. . . .	. . . .	−374,000	. . . .	. . . .	−16,322,000	. . . .	. . . .	+2,659,000
Total Value . . . . $	77,128,000	12,000,000	88,754,000	84,533,900	12,253,200	80,465,100	. . . .	. . . .	97,621,500

PRODUCTION, UTILIZATION AND FARM VALUE OF MILK IN ONTARIO, YEARS 1948-1949

1948 FINAL

Classification of Whole Milk Products	Product Lbs.	Butter-fat Lbs.	Milk Lbs.	Unit of Price	Average Price	Farm Value of Milk
I.—Used in Manufacture:					$ c.	$
(a) Factory Dairy Products—						
1. Creamery Better	74,727,000	61,276,000	1,750,853,000	lb. B.F.	.729	44,692,000
2. Cheddar Cheese	68,157,000	26,581,000	759,269,000	cwt. milk	2.74	20,834,000
3. Other Cheese	2,003,000	758,000	21,658,000	cwt. milk	2.63	569,000
4. Ice Cream (gal.)	10,249,000	5,124,000	146,458,000	cwt. milk	2.90	4,253,000
5. Condensed Milk	18,181,000	1,454,000	41,453,000	cwt. milk	2.96	1,226,000
6. Evaporated Milk	130,747,000	10,068,000	287,643,000	cwt. milk	2.96	8,506,000
7. Whole Milk Powder	12,562,000	3,517,000	100,496,000	cwt. milk	2.96	2,972,000
8. Cream Powder	24,000	18,000	504,000	cwt. milk	2.96	15,000
9. Malted Milk	381,000	67,000	1,905,000	cwt. milk	2.96	56,000
10. Sub-Standard Products—(Baby Foods)	4,134,000	248,000	7,069,000	cwt. milk	2.96	209,000
11. Cottage Cheese	1,581,000	47,000	1,360,000	cwt. milk	2.63	36,000
(b) Farm-made Products—						
1. Dairy Butter	9,880,000	8,102,000	231,488,000	lb. butter	.6870	6,788,000
2. Farm-made Cheese	154,000	60,000	1,715,000	lb. cheese	.2700	42,000
II.—Milk Otherwise Used						
1. Fluid Sales	1,552,820,000	54,349,000	1,552,820,000	cwt. milk	3.64	56,554,000
2. Farm-home Consumed	487,900,000	17,076,000	487,900,000	cwt. milk	2.82	13,759,000
3. Fed to Live Stock	180,100,000	6,304,000	180,100,000	cwt. milk	2.82	5,079,000
TOTAL MILK PRODUCTION	....	195,049,000	5,572,691,000	....	....	165,590,000

1949 PRELIMINARY

Classification of Whole Milk Products	Product Lbs.	Butter-fat Lbs.	Milk Lbs.	Unit of Price	Average Price	Farm Value of Milk
I.—Used in Manufacture:						
(a) Factory Dairy Products—						
1. Creamery Butter	74,516,000	61,103,000	1,745,910,000	lb. B.F.	.607	37,081,000
2. Cheddar Cheese	83,385,000	32,520,000	928,909,000	cwt. milk	2.44	22,648,000
3. Other Cheese	1,753,000	659,000	18,813,000	cwt. milk	2.42	455,000
4. Ice Cream (gal.)	9,902,000	6,047,000	172,784,000	cwt. milk	2.47	4,274,000
5. Condensed Milk	14,163,000	1,133,000	32,292,000	cwt. milk	2.57	830,000
6. Evaporated Milk	100,422,000	7,732,000	220,928,000	cwt. milk	2.57	5,679,000
7. Whole Milk Powder	10,195,000	2,855,000	81,560,000	cwt. milk	2.57	2,097,000
8. Cream Powder	25,000	18,000	525,000	cwt. milk	2.57	13,000
9. Malted Milk	409,000	72,000	2,045,000	cwt. milk	2.57	53,000
10. Sub-Standard Products—(Baby Foods)	4,577,000	275,000	7,827,000	cwt. milk	2.57	201,000
11. Cottage Cheese	1,158,000	35,000	996,000	cwt. milk	2.42	24,000
(b) Farm-made Products—						
1. Dairy Butter	7,400,000	6,068,000	173,382,000	lb. butter	.6210	4,595,000
2. Farm-made Cheese	152,000	59,000	1,693,000	lb. cheese	.2500	38,000
II.—Milk Other Used:						
1. Fluid Sales	1,569,465,000	54,931,000	1,569,465,000	cwt. milk	3.46	54,352,000
2. Farm-home Consumed	523,200,000	18,312,000	523,200,000	cwt. milk	2.39	12,504,000
3. Fed to Live Stock	196,800,000	6,888,000	196,800,000	cwt. milk	2.39	4,704,000
TOTAL MILK PRODUCTION	....	198,707,000	5,677,129,000	....	....	149,548,000

PRODUCTION AND VALUE OF DAIRY PRODUCTS IN ONTARIO, 1948-1949

Classification of Whole Milk Products	1948 FINAL			1949 PRELIMINARY		
	Production	Price per Unit	Value	Production	Price per Unit	Value
	lbs.	c.	$	lbs.	c.	$
I.—Made in Factories:						
1. Creamery Butter	74,727,000	68.64	51,293,000	74,516,000	60.00	44,710,000
2. Cheddar Cheese	68,157,000	31.84	21,701,000	83,385,000	31.50	26,266,000
Net Increase in Processing	....	......	664,000	....	......	638,000
Total Value Cheddar	....	......	22,365,000	....	......	26,904,000
3. Other Cheese—True Cheese	1,240,000	37.10	460,000	918,000	35.00	321,000
Cream Cheese	763,000	47.00	359,000	835,000	45.00	376,000
4. Ice Cream (gal.)	10,249,000	$ 1.44	14,759,000	9,902,000	$ 1.57	15,546,000
5. Condensed Milk	18,181,000	17.35	3,154,000	14,163,000	20.00	2,833,000
6. Evaporated Milk	130,747,000	11.96	15,637,000	100,422,000	13.00	13,055,000
7. Whole Milk Powder	12,562,000	41.69	5,237,000	10,195,000	38.00	3,874,000
8. Cream Powder	24,000	53.99	13,000	25,000	54.00	14,000
9. Malted Milk	381,000	33.00	126,000	409,000	33.20	136,000
10. Unclassified (sub-standard and other)	4,134,000	28.00	1,158,000	4,577,000	35.00	1,602,000
II.—Made on Farms:						
1. Dairy Butter	9,880,000	68.70	6,788,000	7,400,000	62.10	4,595,000
2. Farm-made Cheese	154,000	27.00	42,000	152,000	25.00	38,000
III.—Milk Otherwise Used:						
1. Fluid Sales	1,552,820,000	$4.64	72,082,000	1,569,465,000	$4.50	70,674,000
2. Farm-house Consumed	487,900,000	$2.82	13,759,000	523,200,000	$2.39	12,504,000
3. Fed to Live Stock	180,100,000	$2.82	5,079,000	196,800,000	$2.39	4,704,000
Classification of Milk By-Products						
I.—Made in Factories:						
1. Condensed Skim Milk	4,357,000	12.09	527,000	3,424,000	13.00	445,000
2. Evaporated Skim Milk	4,462,000	4.69	209,000	7,756,000	5.00	388,000
3. Powdered Skim Milk	27,988,000	13.96	3,907,000	30,057,000	11.30	3,396,000
4. Casein	973,000	24.98	243,000	889,000	21.60	192,000
5. Powdered Buttermilk	1,821,000	9.14	166,000	2,508,000	8.40	211,000
6. Condensed Buttermilk	2,704,000	3.37	91,000	3,357,000	4.00	134,000
7. Sugar of Milk	1,116,000	18.00	201,000	1,424,000	21.00	299,000
8. Whey Powder	2,600,000	6.10	159,000	4,454,000	7.00	312,000
9. Whey Butter	1,701,000	61.01	1,038,000	1,967,000	54.00	1,062,000
10. Cottage Cheese	1,581,000	15.87	251,000	1,158,000	16.00	185,000

11. Whey from Cheddar Cheese less used in manufacture	492,652,000	15.00	739,000	575,958,000	15.00	864,000
12. Skim Milk and Buttermilk for Human Consumption	57,963,000	$1.02	591,000	61,922,000	$ .97	601,000
13. Skim Milk and Buttermilk from Creamery Butter less quantity used	87,720,000	30.00	263,000	47,260,000	30.00	142,000
II.—Kept on Farms:						
1. Skim Milk and Buttermilk from Creamery Butter	1,126,149,000	30.00	3,378,000	1,122,970,000	30.00	3,369,000
2. Skim Milk and Buttermilk from Dairy Butter	222,228,000	30.00	667,000	166,447,000	30.00	499,000
3. Whey from Farm-made Cheese	1,286,000	15.00	2,000	1,270,000	15.00	2,000
TOTAL VALUE	....	....	224,743,000	....	....	213,987,000

ESTIMATED MILK PRODUCTION AND UTILIZATION IN ONTARIO, YEARS 1948-49
'000 lbs.

Year	Estimated Quantity of Milk used for Specified Purposes, expressed in '000 lbs.								
	Creamery Butter	Factory Cheese	Miscellaneous Factory Products	Dairy Butter	Farm-made Cheese	Fluid Sales of Milk and Cream	Farm-home Consumed	Fed to Livestock	Total Milk Production
1948	1,750,853	782,287	585,528	231,488	1,715	1,552,820	487,900	180,100	5,572,691
Percentage of Total	31.42%	14.04%	10.51%	4.15%	.03%	27.86%	8.76%	3.23%	100%
1949	1,745,910	948,716	517,963	173,382	1,693	1,569,465	523,200	196,800	5,677,129
Percentage of Total	30.75%	16.71%	9.12%	3.05%	.03%	27.65%	9.22%	3.47%	100%

Commodity	Annual Disposition of Whole Milk Production in Ontario — Figures shown as millions of pounds of Milk						Percentage Disposition of Whole Milk Production in Ontario					
	1930	1935	1940	1945	1948	1949	1930 %	1935 %	1940 %	1945 %	1948 %	1949 %
Creamery Butter	1,519	1,976	2,043	1,819	1,751	1,746	31.4	37.8	35.3	30.2	31.4	30.7
Cheddar Cheese	911	846	1,120	1,283	782	949	18.8	16.2	19.4	21.3	14.0	16.7
Concentrated Milk	158	141	265	392	439	345	3.3	2.7	4.6	6.5	7.9	6.1
Ice Cream	66	51	73	99	146	173	1.4	1.0	1.3	1.6	2.6	3.0
Total Factory Products	2,654	3,014	3,500	3,593	3,118	3,213	54.9	57.7	60.5	59.6	55.9	56.5
Dairy Butter	570	449	338	179	231	173	11.8	8.6	5.8	3.0	4.2	3.0
Farm Cheese	1.4	1.6	1.8	1.7	1.7	1.7	0.03	0.03	0.03	0.03	....	0.1
Total Farm Products	571	451	339	181	233	175	11.8	8.6	5.9	3.0	4.2	3.1
Fluid Sales	972	1,087	1,210	1,564	1,553	1,569	20.0	20.8	20.9	25.9	27.9	27.7
Farm Home Consumed	406	454	505	496	488	523	8.3	8.7	8.7	8.2	8.7	9.2
Fed to Live Stock	231	222	231	197	180	197	5.0	4.3	4.0	3.3	3.3	3.5
Total Otherwise Used	1,609	1,763	1,946	2,257	2,221	2,289	33.3	33.7	33.6	37.4	39.9	40.4
TOTAL PRODUCTION	4,834	5,229	5,786	6,032	5,572	5,677	100	100	100	100	100	100

ANNUAL PRODUCTION OF CONCENTRATED MILK PRODUCTS IN ONTARIO, CALENDAR YEARS 1942–1949

Commodity	1942	1943	1944	1945	1946	1947	1948	1949
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Condensed Buttermilk	1,695,585	1,635,928	2,297,706	2,539,353	2,377,087	3,530,915	2,703,660	3,356,528
Condensed Skim Milk	5,075,986	3,994,884	3,532,571	4,484,521	3,244,405	3,728,586	4,442,966	3,423,657
Condensed Whole Milk, B.G.	6,149,594	6,358,249	9,086,952	7,631,574	6,892,497	7,281,033	7,395,765	7,398,045
Condensed Whole Milk, C.G.	7,206,882	7,757,497	8,739,885	8,417,061	7,873,176	10,238,054	10,500,565	6,765,151
Evaporated Whole Milk, C.G.	98,261,167	95,992,425	89,133,307	102,967,326	96,147,045	109,929,164	128,127,835	100,273,623
Evaporated Whole Milk, B.G.	428,009	474,073	527,895	604,032	1,916,622	668,666	210,969	148,085
Evaporated Skim Milk	1,120,136	1,061,334	1,296,044	1,639,400	2,179,853	2,962,282	4,378,874	7,755,591
Powdered Buttermilk	2,906,049	2,336,305	1,549,728	1,379,344	1,313,773	1,523,759	1,781,986	2,564,568
Powdered Skim Milk, S.P.	10,901,398	9,234,558	9,199,265	10,813,567	11,780,218	13,468,593	14,011,760	15,992,828
Powdered Skim Milk—feed	2,824,639	1,013,248	511,971	1,508,446	620,304	1,121,842	1,009,412	1,113,467
Powdered Skim Milk, R.P.	4,278,805	5,060,655	7,678,087	8,299,858	10,849,862	11,895,622	12,804,723	12,990,606
Powdered Whole Milk, S.P.	8,998,196	13,299,568	11,512,005	11,729,297	11,432,078	8,559,550	8,628,331	7,711,546
Powdered Whole Milk, R.P.	2,439,312	2,911,471	3,896,340	2,482,196	3,103,048	4,578,457	5,190,788	3,310,394
Casein	1,106,216	912,514	948,988	954,331	937,181	1,287,319	957,990	954,060
Miscellaneous Powdered Products	1,193,547	1,745,055	1,378,159	1,203,986	2,142,929	3,196,743	4,558,814	9,984,144
TOTAL	154,585,521	153,817,764	151,288,903	166,654,292	162,810,078	183,970,585	206,704,438	183,742,293

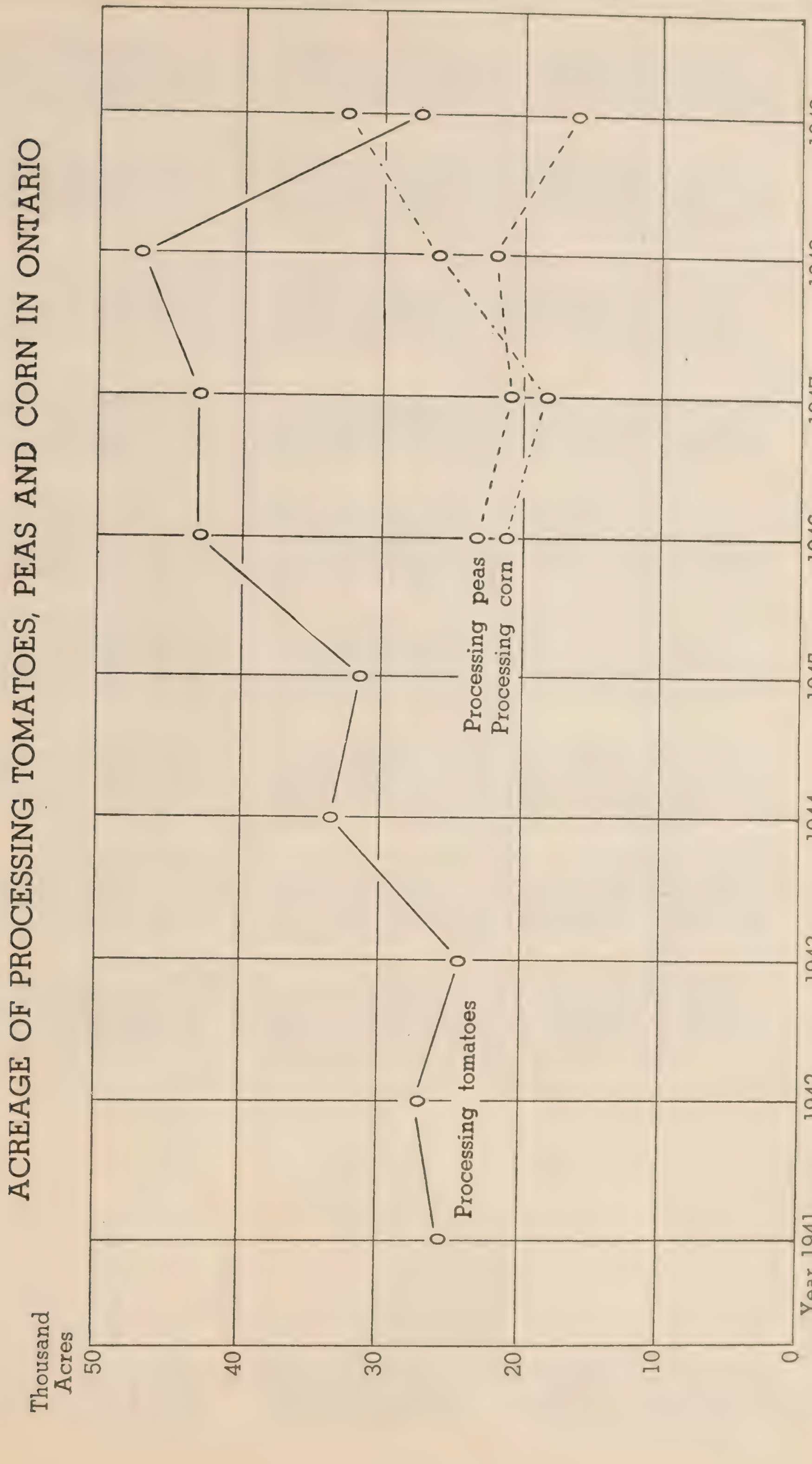
NOTE: B.G., Bulk Goods; C.G., Case Goods; S.P., Spray Process; R.P., Roller Process.

MONTHLY PRODUCTION OF DAIRY PRODUCTS IN ONTARIO, YEARS 1948-49

Month	Creamery Butter		Cheddar Cheese		Ice Cream		Condensed, evaporated and Powdered Milk Products	
	1948 '000 lbs.	1949 '000 lbs.	1948 '000 lbs.	1949 '000 lbs.	1948 '000 gal.	1949 '000 gal.	1948 '000 lbs.	1949 '000 lbs.
January	3,098	3,325	626	471	404	393	8,001	9,957
February	2,974	3,184	610	339	425	452	7,825	8,916
March	4,243	4,636	1,218	1,051	648	624	12,324	13,602
April	5,814	6,262	2,921	4,391	801	765	16,265	16,718
May	8,866	8,674	8,311	11,450	937	970	24,964	20,221
June	10,960	9,942	14,242	15,025	1,303	1,466	29,751	22,115
July	9,617	8,402	12,686	12,822	1,613	1,538	26,346	18,497
August	8,508	7,857	10,712	11,027	1,468	1,506	24,853	18,035
September	7,065	7,364	8,407	10,646	1,128	711	20,653	17,072
October	5,642	6,242	5,249	9,257	550	648	17,386	16,540
November	4,249	4,757	2,229	4,921	506	453	12,147	12,126
December	3,691	3,871	946	1,985	466	376	11,535	9,861
Total for Year	74,727	74,516	68,157	83,385	10,249	9,902	212,050	183,660

MONTHLY PRODUCTION OF DAIRY PRODUCTS IN ONTARIO, YEARS 1948-49

Month	Dairy Butter		Whey Butter		Farm-made Cheese		Other Cheese	
	1948 '000 lbs.	1949 '000 lbs.	1948 lbs.	1949 lbs.	1948 lbs.	1949 lbs.	1948 lbs.	1949 lbs.
January	937	886	28,000	19,000	12,000	12,000	134,000	141,000
February	1,040	771	22,000	15,000	12,000	12,000	93,000	161,000
March	947	848	42,000	29,000	13,000	13,000	123,000	188,000
April	1,097	823	78,000	91,000	13,000	13,000	179,000	137,000
May	1,041	560	178,000	239,000	13,000	13,000	118,000	138,000
June	656	448	298,000	316,000	13,000	13,000	193,000	126,000
July	553	291	296,000	294,000	13,000	13,000	175,000	92,000
August	506	390	272,000	282,000	13,000	13,000	233,000	128,000
September	544	425	231,000	259,000	13,000	13,000	231,000	176,000
October	562	502	153,000	219,000	13,000	13,000	196,000	153,000
November	816	653	74,000	137,000	13,000	12,000	183,000	160,000
December	1,181	803	29,000	67,000	13,000	12,000	145,000	153,000
Total for Year	9,880	7,400	1,701,000	1,967,000	154,000	152,000	2,003,000	1,753,000



ACREAGE OF PROCESSING TOMATOES, PEAS AND CORN IN ONTARIO

PRODUCTION OF CREAMERY BUTTER IN ONTARIO, YEARS 1941–49

Counties and Districts	1941	1942	1943	1944	1945	1946	1947	1948	1949
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Brant	980,530	1,024,251	771,110	578,535	744,933	525,149	648,163	623,170	877,762
Elgin	793,713	716,378	666,288	565,963	549,839	462,879	483,636	461,715	401,480
Essex	548,890	497,994	405,459	336,457	300,602	231,648	273,666	231,272	234,014
Haldimand	2,652,285	2,631,802	2,391,003	2,234,909	1,575,358	1,074,153	1,296,374	1,486,720	2,070,038
Kent	2,765,692	2,514,129	2,575,865	2,372,004	2,429,430	1,954,378	2,055,213	1,897,646	1,667,226
Lambton	3,303,022	3,511,952	3,007,847	2,643,063	2,691,976	2,249,773	2,437,615	2,460,266	2,420,602
Lincoln	491,499	417,470	416,740	411,749	418,332	318,851	324,320	272,875	254,904
Middlesex	4,811,684	4,257,622	4,076,740	3,339,225	3,575,271	2,545,129	2,685,570	2,986,205	2,849,848
Norfolk	721,893	766,113	678,067	521,701	882,491	405,210	819,141	911,124	984,945
Oxford	1,032,208	665,674	935,049	659,677	783,724	730,531	799,760	929,434	676,805
Welland	317,991	278,859	272,300	266,744	244,712	197,165	227,455	174,682	238,830
Wentworth	271,182	179,891	150,253	114,896	490,202	88,212	88,823	63,329	49,653
Southern Ontario	18,690,589	17,462,135	16,346,721	14,044,923	14,686,870	10,783,078	12,139,736	12,498,438	12,726,107
Bruce	5,602,752	5,412,326	5,708,963	5,507,566	5,784,564	5,245,375	5,727,531	5,379,362	5,531,917
Dufferin	1,749,099	1,779,731	1,659,006	1,633,694	1,637,033	1,527,835	1,634,379	1,656,465	1,670,149
Grey	5,556,396	5,298,676	5,082,902	5,026,460	5,007,551	4,777,468	5,271,198	5,293,506	5,368,371
Halton	1,122,598	1,097,742	961,127	953,742	939,137	781,952	821,092	757,386	741,089
Huron	4,824,405	5,116,800	4,941,276	4,794,723	4,927,018	4,394,465	4,765,012	3,718,375	3,721,483
Peel	1,105,191	976,760	870,297	755,377	930,848	833,122	929,078	934,269	951,463
Perth	5,500,951	5,029,866	5,533,422	5,041,391	5,425,396	4,632,914	5,319,012	4,562,336	4,800,382
Simcoe	4,436,770	4,322,194	4,043,076	3,860,018	3,821,439	3,335,895	3,678,207	3,721,414	3,597,705
Waterloo	3,746,248	3,673,248	3,729,751	3,680,433	3,785,485	3,350,039	3,451,760	3,326,300	3,178,652
Wellington	4,084,042	4,295,971	4,346,243	4,054,750	4,299,460	4,342,443	4,590,480	4,333,732	4,722,553
Western Ontario	37,728,452	37,003,314	36,876,063	35,308,154	36,577,931	33,221,508	36,187,749	33,683,145	34,283,764
Durham	989,529	954,386	958,083	864,130	882,712	934,320	1,054,655	951,429	973,853
Haliburton	....	....	....	....	....	....	....	....	....
Hastings	2,533,625	1,909,135	2,337,086	1,932,248	2,143,358	2,024,065	2,460,913	2,680,066	2,234,281
Muskoka	155,034	....	....	....	....	....	....	....	....
Northumberland	2,073,867	....	....	....	....	....	....	....	....
Ontario	1,397,458	1,910,065	2,246,154	1,926,420	1,929,341	1,893,578	2,170,084	2,130,175	2,000,268
Parry Sound	111,587	1,312,100	1,283,330	1,056,671	1,039,654	800,539	877,543	837,066	875,321
Peterborough	1,197,571	271,281	317,284	281,225	297,274	267,057	253,653	220,379	182,144
Prince Edward	268,880	1,063,208	1,088,099	869,683	905,297	834,557	953,156	833,720	752,759
Victoria	2,260,486	122,601	198,934	141,616	135,274	140,278	184,502	230,003	151,671
York	4,753,607	2,237,399	2,386,764	2,305,173	2,041,420	2,053,889	2,356,572	2,192,834	2,205,721
		4,320,804	3,812,610	3,445,749	3,164,124	2,741,194	2,934,849	3,090,073	2,938,098
Central Ontario	15,741,644	14,100,979	14,628,344	12,822,915	12,538,454	11,689,477	13,245,927	13,165,745	12,314,116

Carleton	1,212,892	986,181	1,316,807	998,776	1,038,084	1,067,552	1,422,779	1,470,670	1,374,421
Dundas	15,675	67,243	5,856	....	3,110	1,846	133,889	45,391	197,621
Frontenac	1,075,313	823,243	1,119,150	987,397	1,232,619	1,095,565	1,125,929	1,418,622	1,263,169
Glengarry	312,075	167,454	305,471	188,729	245,233	271,197	338,560	314,294	256,464
Grenville	445,989	207,595	341,297	238,864	218,651	186,017	239,327	209,056	205,284
Lanark	1,976,901	1,727,018	2,068,687	1,691,810	1,891,649	1,769,078	2,141,175	2,077,723	2,374,303
Leeds	451,891	188,048	187,083	171,700	169,782	107,614	144,221	221,176	610,911
Lennox and Addington	440,829	219,189	338,082	211,512	233,138	270,932	314,542	353,798	342,294
Prescott	102,367	6,033	86,675	33,480	36,258	71,486	161,569	435,800	405,383
Renfrew	2,905,729	3,125,009	3,409,655	3,103,685	3,137,197	3,316,045	3,735,736	3,755,010	3,664,840
Russell	455,582	214,559	447,994	297,862	1,080,649	1,035,913	1,335,214	513,040	391,292
Stormont	384,721	185,143	297,794	202,341	187,409	118,201	168,410	139,636	147,275
Eastern Ontario	9,779,964	7,916,715	9,924,551	8,126,156	9,473,779	9,311,445	11,261,351	10,954,216	11,233,257
Algoma	555,910	558,629	608,248	564,731	562,716	534,465	571,485	523,168	478,304
Cochrane	182,899	196,337	295,547	242,773	293,491	272,867	335,689	339,476	331,570
Kenora	48,932	47,377	37,426	44,046	51,444	32,644	24,345	17,206	23,950
Manitoulin	824,381	876,205	920,234	846,235	852,141	842,573	876,700	792,577	786,930
Nipissing	1,099,479	1,105,060	1,175,699	1,120,958	1,025,376	913,512	953,163	899,274	822,217
Rainy River	527,320	574,317	655,666	586,754	501,357	433,784	450,202	489,907	487,449
Sudbury	100,863	67,254	76,245	79,214	82,943	78,973	90,492	72,122	44,064
Thunder Bay	123,377	85,167	65,714	64,122	44,276	8,811	8,520	13,630	41,714
Timiskaming	948,735	873,513	887,624	951,765	820,482	831,100	885,096	1,013,577	942,209
Northern Ontario	4,411,896	4,383,859	4,722,403	4,500,598	4,234,226	3,948,729	4,195,692	4,160,937	3,958,407
The Province	86,352,545	80,867,002	82,498,082	74,802,746	77,511,260	68,954,237	77,030,450	74,462,481	74,515,651

PRODUCTION OF CHEDDAR CHEESE IN ONTARIO, YEARS 1941–49

Counties and Districts	1941	1942	1943	1944	1945	1946	1947	1948	1949
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Brant	47,714	226,329	62,994	......	......	......	......	......	......
Elgin	1,505,461	1,943,570	1,297,038	1,024,288	1,198,730	900,656	964,246	434,584	682,434
Essex	......	......	......	......	......	......	......	......	......
Haldimand	......	......	......	......	......	......	......	......	......
Kent	......	......	......	......	......	......	......	......	......
Lambton	278,945	800,936	359,128	354,727	428,359	53,204	208,203	......	......
Lincoln	......	......	......	......	......	......	......	......	......
Middlesex	2,980,173	4,551,576	3,653,716	4,020,737	4,431,102	3,869,614	3,865,939	3,428,781	3,416,169
Norfolk	22,324	33,580	26,481	20,946	......	......	......	......	122,329
Oxford	6,600,979	9,084,219	6,649,390	7,969,658	8,340,829	7,070,784	6,328,296	2,860,917	5,326,289
Welland	136,724	135,640	82,920	137,945	115,937	67,302	......	......	......
Wentworth	......	......	......	......	......	......	......	......	......
Southern Ontario	11,572,320	16,775,850	12,131,667	13,528,301	14,514,957	11,961,560	11,366,684	6,724,282	9,547,221
Bruce	596,762	743,028	548,945	639,904	710,332	615,109	624,015	614,690	778,590
Dufferin	......	......	......	......	......	......	......	......	......
Grey	......	167,751	329,225	406,696	485,621	177,093	4,350	22,850	70,301
Halton	......	......	......	......	......	......	......	......	......
Huron	1,084,321	1,643,104	1,179,236	1,290,688	1,569,465	1,542,901	676,224	461,283	669,683
Peel	......	......	......	......	......	......	......	......	......
Perth	3,611,455	5,834,447	3,781,914	4,694,012	4,737,613	3,937,925	3,438,246	2,452,693	2,896,761
Simcoe	......	......	......	......	96,143	220,838	125,983	85,839	......
Waterloo	653,772	1,239,594	685,697	881,597	929,620	619,782	569,816	423,290	449,726
Wellington	6,188	4,510	9,666	13,768	7,715	7,065	7,003	6,329	136,433
Western Ontario	5,952,498	9,632,434	6,534,683	7,926,665	8,536,509	7,120,713	5,445,637	4,066,974	5,001,494
Durham	......	......	......	......	......	......	......	......	......
Haliburton	......	......	......	......	......	......	......	......	......
Hastings	9,426,779	10,592,402	8,683,476	8,566,657	9,266,917	8,148,821	7,385,410	6,083,450	7,052,567
Muskoka	......	......	......	......	......	......	......	......	......
Northumberland	3,930,946	4,674,943	3,835,530	3,940,764	4,227,689	3,500,406	3,454,565	2,681,152	3,518,735
Ontario	257,429	420,873	227,343	278,009	258,333	146,150	92,291	40,074	......
Parry Sound	......	......	......	......	......	......	......	......	......
Peterborough	1,513,236	1,667,568	1,276,879	1,388,162	1,640,721	1,176,117	1,064,970	778,313	910,558
Prince Edward	3,099,288	4,117,589	3,577,334	3,458,567	3,637,965	3,259,592	3,271,488	2,655,989	3,390,186
Victoria	186,987	234,189	138,800	139,422	153,875	109,379	136,519	82,563	108,050
York	......	......	......	......	......	......	......	......	......
Central Ontario	18,414,665	21,707,564	17,739,362	17,771,581	19,185,500	16,340,465	15,405,243	12,321,541	14,980,096

Carleton	5,969,023	6,989,151	5,861,799	5,252,955	5,477,989	4,280,481	4,107,465	2,909,184	4,272,891
Dundas	6,636,944	7,747,515	6,708,543	6,672,937	6,902,399	5,222,665	4,620,558	4,337,238	5,191,382
Frontenac	5,264,693	5,822,016	5,027,200	5,029,861	5,584,069	4,759,045	4,298,422	3,230,810	3,462,920
Glengarry	7,450,791	8,564,061	7,779,637	7,468,818	7,752,001	6,711,899	7,040,876	5,475,350	6,605,535
Grenville	2,552,811	3,235,426	2,573,138	2,078,588	2,295,254	1,713,154	1,527,992	1,201,440	1,820,884
Lanark	3,058,025	3,560,168	2,915,938	2,665,327	3,023,649	2,648,563	2,372,888	1,748,430	2,282,683
Leeds	7,584,558	8,430,757	7,385,247	6,697,528	7,251,744	5,365,415	5,500,813	4,748,390	5,840,134
Lennox and Addington	5,233,436	6,738,001	5,494,552	5,465,854	6,220,754	5,652,599	5,515,049	4,575,908	5,346,576
Prescott	8,392,762	9,317,312	8,654,766	9,145,023	9,573,149	7,858,596	7,210,870	5,590,660	6,387,716
Renfrew	591,300	748,126	712,333	859,350	959,500	417,691	328,389	222,968	349,250
Russell	5,791,362	7,089,482	6,460,052	5,957,783	6,515,144	5,045,452	4,808,860	3,684,413	4,472,207
Stormont	7,527,486	8,790,222	7,818,307	7,683,927	7,970,597	7,338,124	6,845,961	4,858,727	7,032,348
Eastern Ontario	66,053,191	77,032,237	67,391,512	64,972,950	69,526,249	57,013,685	54,178,143	42,583,518	53,064,526
Algoma	....	64,597	43,743	29,850	76,670	61,730	....	....	....
Cochrane	143,606	231,388	250,692	341,272	276,651	156,627	70,777	131,002	104,789
Kenora	....	....	1,870	13,644	34,753	25,387	32,467	15,761	....
Manitoulin	....	....	....	....	....	....	....	....	....
Nipissing	406,269	611,141	682,270	400,724	780,674	720,879	684,674	428,083	363,704
Rainy River	....	....	....	....	....	....	....	....	....
Sudbury	65,872	28,605	....	....	121,048	57,436	29,531	....	40,812
Thunder Bay	90,550	298,967	239,150	240,566	175,653	105,819	55,992	....	....
Timiskaming	67,817	153,877	82,629	439,930	175,704	174,923	213,051	264,293	282,195
Northern Ontario	774,114	1,388,575	1,300,354	1,465,986	1,641,153	1,302,801	1,086,492	839,139	791,500
The Province	102,766,788	126,536,660	105,097,578	105,665,483	113,404,368	93,739,254	87,482,199	66,535,454	83,384,837

AVERAGE MONTHLY WHOLESALE PRICES OF BUTTER AND CHEESE AT TORONTO, JANUARY, 1935 TO FEBRUARY, 1950

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
A.—Butter year per lb.:												
1935 ....cents	22.8	25.2	24.4	24.3	22.0	19.5	20.0	20.7	22.2	23.6	25.1	25.8
1936 ....cents	25.1	23.0	22.7	22.7	20.3	21.9	23.7	25.3	24.8	23.7	25.1	26.0
1937 ....cents	26.4	25.3	26.0	26.7	23.2	24.1	25.7	27.0	27.0	28.1	30.2	30.4
1938 ....cents	31.7	34.6	35.6	32.6	27.0	25.5	25.2	23.8	22.7	22.5	21.9	21.6
1939 ....cents	22.6	22.0	22.0	21.4	20.8	21.8	21.9	21.5	26.1	28.0	28.3	27.9
1940 ....cents	27.6	26.9	27.7	26.4	23.0	22.1	22.0	22.1	23.3	27.3	30.1	35.0
1941 ....cents	33.8	33.8	34.8	31.1	30.0	31.4	35.1	37.1	34.5	32.7	34.0	34.0
1942 ....cents	34.0	34.4	35.2	35.3	35.0	34.2	34.0	34.5	35.1	35.2	36.0	36.1
1943 ....cents	35.0	35.0	35.0	35.0	33.4	33.0	33.0	33.1	33.5	34.1	34.9	35.0
1944 ....cents	35.0	35.0	35.0	35.0	33.9	33.2	33.0	33.9	34.8	35.0	35.0	35.0
1945 ....cents	35.0	35.0	35.0	34.6	33.9	33.6	34.1	34.2	34.3	35.1	36.0	36.0
1946 ....cents	36.0	36.0	36.0	40.0	38.6	38.2	39.6	40.0	40.0	40.0	40.0	40.0
1947 ....cents	40.0	40.0	40.0	40.0	48.6	50.0	50.8	55.6	60.3	58.0	60.9	67.4
1948 ....cents	68.1	67.3	67.3	67.3	66.6	66.0	67.5	68.0	66.0	68.0	68.0	68.0
1949 ....cents	68.0	68.0	60.5	58.3	58.0	58.0	58.0	58.4	58.6	58.7	60.4	60.8
1950 ....cents	60.8	60.8	....	....	....	....	....	....	....	....	....	....
B.—Cheese year per lb.:												
1935 ....cents	11.3	11.6	12.0	12.0	10.1	10.4	10.5	10.3	1.16	12.2	11.1	11.9
1936 ....cents	12.4	12.1	11.6	10.4	11.2	13.2	13.5	14.8	15.2	13.6	13.8	13.6
1937 ....cents	13.5	13.4	13.2	13.2	14.5	15.2	14.5	14.2	14:4	14.4	14.6	14.7
1938 ....cents	15.1	15.6	16.0	15.9	15.0	14.8	14.5	14.2	14.2	14.2	13.0	11.4
1939 ....cents	11.4	11.4	11.2	10.7	10.2	12.5	12.4	11.4	13.4	14.5	16.2	17.2
1940 ....cents	18.4	19.3	18.3	14.8	14.0	13.8	14.0	14.3	14.1	14.4	15.1	15.2
1941 ....cents	15.5	15.0	15.1	16.0	16.1	*15.6	*15.6	*15.6	*15.6	*15.6	†25.0	†25.0
1942 ....cents	25.4	26.2	26.3	21.6	20.9	20.2	20.0	20.0	20.0	20.2	22.4	22.9
1943 ....cents	22.7	23.3	23.3	23.3	23.3	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0
1944 ....cents	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0
1945 ....cents	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§20.0	§22.1
1946 ....cents	§22.2	§22.2	§22.2	§22.2	§22.2	§20.0	§20.0	§20.0	§20.0	§20.0	§22.2	§22.2
1947 ....cents	§22.2	§22.2	§22.2	§22.2	§25.2	27.2	27.6	28.3	§25.2	§25.1	§25.2	36.0
1948 ....cents	36.9	37.1	36.7	34.0	34.0	34.6	34.3	§30.0	§30.0	§30.0	34.4	34.3
1949 ....cents	33.8	33.8	33.2	31.7	31.6	31.5	31.5	31.5	31.5	31.9	32.2	31.8
1950 ....cents	29.9	28.2	....	....	....	....	....	....	....	....	....	....

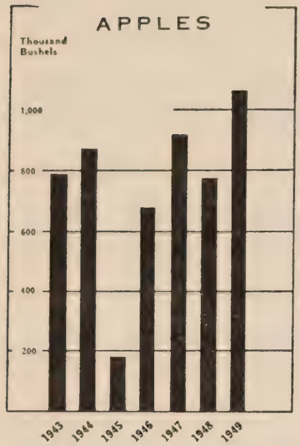
*Prices of cheese for export f.o.b. Montreal. §F.O.B. Factory Shipping Point.

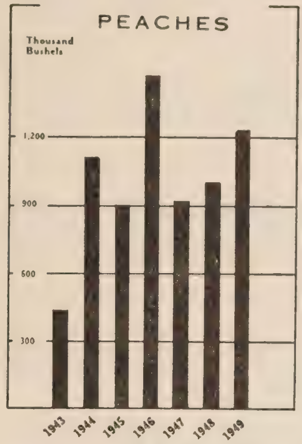
EXPORTS OF CHEESE, BUTTER, AND CONCENTRATED MILK PRODUCTS FROM CANADA, CALENDAR YEARS 1937–1949

Year Ending, December 31	To the United Kingdom	To All Countries					
	Cheese	Cheese	Butter	Whole Milk Powder	Skim-Milk Powder	Condensed Milk	Evaporated Milk
1949 . . . . lbs.	50,122,400	52,694,800	1,068,800	6,055,200	29,379,400	15,992,900	20,541,100
$	15,230,308	16,256,818	613,751	2,682,767	3,179,562	2,858,203	2,488,106
1948 . . . . lbs.	37,381,300	39,827,400	882,200	7,450,000	29,291,900	21,219,400	32,291,500
$	11,085,099	12,042,200	625,212	3,328,269	3,464,098	4,056,190	4,341,916
1947 . . . . lbs.	53,861,000	55,531,100	3,107,100	5,306,100	14,932,100	18,225,100	41,528,400
$	13,599,246	14,162,303	1,597,095	2,162,368	1,905,969	2,796,820	4,803,940
1946 . . . . lbs.	104,243,500	106,495,400	4,509,400	4,972,500	6,051,300	18,316,100	47,186,900
$	21,251,457	21,947,738	2,003,302	1,958,414	714,703	2,444,748	4,506,731
1945 . . . . lbs.	132,855,400	135,409,300	5,598,300	5,995,300	6,669,200	18,652,300	70,810,400
$	27,123,611	27,909,305	2,235,749	2,261,057	795,647	2,408,727	6,627,493
1944 . . . . lbs.	128,872,900	131,429,200	4,726,700	1,083,300	21,600	17,907,800	27,325,300
$	26,319,221	27,062,454	1,881,278	405,681	2,951	2,380,127	2,629,822
1943 . . . . lbs.	126,604,700	129,741,000	9,408,600	1,414,000	409,400	17,160,100	26,737,700
$	25,895,674	26,811,113	3,819,800	468,507	93,755	2,143,541	2,515,774
1942 . . . . lbs.	131,374,000	141,503,900	1,600,900	2,628,400	437,900	14,594,800	49,228,500
$	24,558,965	26,903,714	580,019	873,899	108,659	1,611,813	4,181,529
1941 . . . . lbs.	89,089,100	92,331,000	1,481,800	5,029,000	675,500	18,118,200	51,237,100
$	12,879,326	13,554,911	493,525	1,474,467	135,877	1,677,141	3,930,963
1940 . . . . lb°.	103,192,400	106,631,100	1,337,600	4,348,400	923,900	6,813,700	34,745,900
$	15,090,317	15,723,486	382,299	977,443	146,714	616,139	2,556,422
1939 . . . . lbs.	81,153,800	90,944,800	12,398,600	6,021,400	2,300,000	1,136,300	25,012,200
$	10,802,873	12,248,650	2,673,765	1,204,040	178,830	110,502	1,801,419
1938 . . . . lbs.	76,048,100	80,989,100	3,893,400	4,533,200	846,500	2,674,800	27,022,700
$	11,023,338	11,874,223	871,547	916,165	79,006	262,042	2,199,179
1937 . . . . lbs.	81,181,500	88,955,300	4,096,600	4,309,800	. . . .	4,131,100	24,841,400
$	11,825,692	13,062,330	1,147,274	834,023	. . . .	504,270	1,835,838

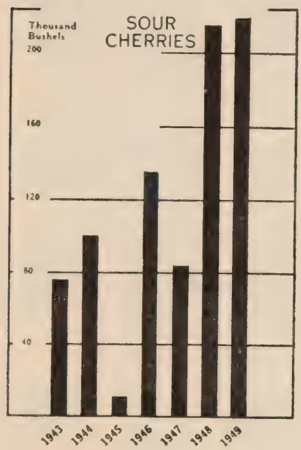
COMMERCIAL FRUIT PRODUCTION IN ONTARIO, YEARS 1942–1949

Commodity	District	Unit	1942	1943	1944	1945	1946	1947	1948	1949	5-year Average 1945–49
Apples	Eastern Ont.	bbls.	269,000	297,100	343,100	61,500	242,600	424,900	285,636	437,879	290,503
	Western Ont.	bbls.	348,000	493,500	530,200	121,700	437,300	495,800	494,350	700,635	449,957
	Total, Ont.	bbls.	617,000	791,600	873,300	183,200	679,900	920,700	779,986	1,138,514	740,460
Cherries (sweet and sour)	Eastern Ont.	bus.	8,200	4,670	3,900	1,000	11,300	10,100	14,400	21,762	11,712
	Western Ont.	bus.	264,000	107,500	135,900	40,200	172,100	118,200	247,000	248,490	165,198
	Total, Ont.	bus.	272,200	112,170	139,800	41,200	183,400	128,300	261,400	270,252	176,910
Grapes	Eastern Ont.	tons	....	....	....	100	100	50	43	45	68
	Western Ont.	tons	36,000	26,000	28,700	31,400	32,500	35,700	27,279	24,440	30,264
	Total, Ont.	tons	36,000	26,000	28,700	31,500	32,600	35,750	27,322	24,485	30,331
Peaches	Eastern Ont.	bus.	....	....	....	....	....	....	....	....	....
	Western Ont.	bus.	1,620,000	440,000	1,174,200	910,500	1,475,600	923,400	1,030,320	1,237,960	1,115,556
	Total, Ont.	bus.	1,620,000	440,000	1,174,200	910,500	1,475,600	923,400	1,030,320	1,237,960	1,115,556
Pears	Eastern Ont.	bus.	4,600	1,800	3,500	1,500	7,100	12,100	4,740	5,700	6,228
	Western Ont.	bus.	407,500	332,200	368,300	45,400	261,700	380,900	214,733	440,100	268,567
	Total, Ont.	bus.	412,100	334,000	371,800	46,900	268,800	393,000	219,473	445,800	274,795
Plums and Prunes	Eastern Ont.	bus.	1,000	500	900	500	4,900	6,500	9,680	4,450	5,206
	Western Ont.	bus.	189,500	131,000	143,300	26,900	296,500	261,200	285,825	348,375	243,760
	Total, Ont.	bus.	190,500	131,500	144,200	27,400	301,400	267,700	295,505	352,825	248,966
Raspberries	Eastern Ont.	qts.	2,186,000	2,858,800	2,715,900	2,508,000	1,326,000	1,388,000	1,557,000	1,210,300	1,597,860
	Western Ont.	qts.	2,189,000	2,139,000	1,806,000	1,928,800	1,696,700	1,995,000	2,151,842	2,202,800	1,995,028
	Total, Ont.	qts.	4,375,000	4,997,800	4,521,900	4,436,800	3,022,700	3,383,000	3,708,842	3,413,100	3,592,888
Strawberries	Eastern Ont.	qts.	1,200,300	2,222,400	1,155,600	1,452,000	3,099,000	2,234,400	2,127,400	1,186,500	2,019,860
	Western Ont.	qts.	4,247,000	3,750,000	3,522,500	4,694,400	4,660,400	6,121,400	7,942,454	4,163,400	5,516,411
	Total, Ont.	qts.	5,447,300	5,972,400	4,678,100	6,146,400	7,759,400	8,355,800	10,069,854	5,349,900	7,536,271

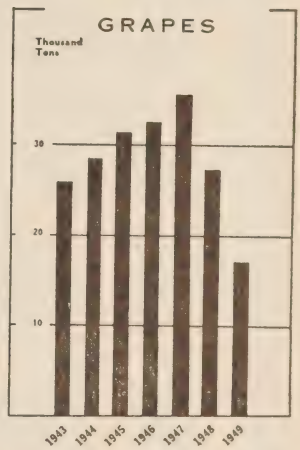

APPLES
Thousand Bushels
1,000
800
600
400
200
1943
1944
1945
1946
1947
1948
1949

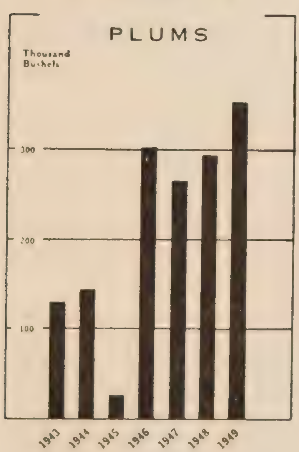

PEACHES
Thousand Bushels
1,200
900
600
300
1943
1944
1945
1946
1947
1948
1949

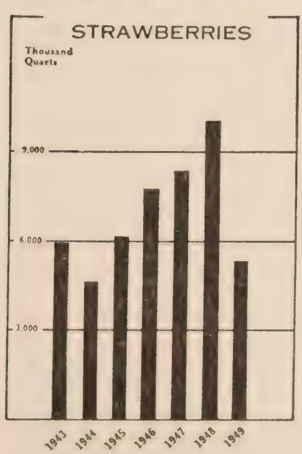

PEARS
Thousand Bushels
400
300
200
100
1943
1944
1945
1946
1947
1948
1949


SOUR CHERRIES
Thousand Bushels
200
160
120
80
40
1943
1944
1945
1946
1947
1948
1949


SWEET CHERRIES
Thousand Bushels
40
20
1943
1944
1945
1946
1947
1948
1949


GRAPES
Thousand Tons
30
20
10
1943
1944
1945
1946
1947
1948
1949


PLUMS
Thousand Bushels
300
200
100
1943
1944
1945
1946
1947
1948
1949


STRAWBERRIES
Thousand Quarts
9,000
6,000
3,000
1943
1944
1945
1946
1947
1948
1949


RASPBERRIES
Thousand Quarts
4,000
2,000
1943
1944
1945
1946
1947
1948
1949

FINAL ESTIMATED PRODUCTION AND VALUE OF SPECIFIED COMMERCIAL FRUITS AND VEGETABLES IN ONTARIO FOR THE YEAR 1949 WITH COMPARATIVE FINAL FIGURES FOR THE YEAR 1948

Commodity and District	YEAR 1948				YEAR 1949			
	Total Acres	Total Production	Farm Selling Value per Unit $ c.	Total Farm Selling Value $	Total Acres	Total Production	Farm Selling Value per Unit $ c.	Total Farm Selling Value $
Apples:		bbl.	bbl.			bbl.	bbl.	
Toronto East	10,895	285,636	4.95	1,413,900	10,880	437,879	2.22	970,200
Toronto West	21,895	494,350	4.23	2,092,100	23,365	700,635	2.16	1,512,600
Total Province	32,790	779,986	4.49	3,506,000	34,245	1,138,514	2.18	2,482,800
Cantaloupes:		bu.	bu.			bu.	bu.	
Toronto East	89	11,570	2.10	24,300	67	18,960	2.35	44,600
Toronto West	725	165,155	1.44	237,800	710	207,520	1.30	269,800
Total Province	814	176,725	1.48	262,100	777	226,480	1.39	314,400
Cherries, Sour:		bu.	bu.			bu.	bu.	
Toronto East	200	14,400	7.06	101,700	208	21,762	6.43	139,800
Toronto West	3,414	201,310	6.54	1,315,700	3,440	200,260	6.09	1,219,500
Total Province	3,614	215,710	6.57	1,417,400	3,648	222,022	6.12	1,359,300
Cherries, Sweet:		bu.	bu.			bu.	bu.	
Toronto East	.....	....	....	....	.....	....	....	....
Toronto West	1,395	45,690	8.73	398,900	1,400	48,230	6.77	326,300
Total Province	1,395	45,690	8.73	398,900	1,400	48,230	6.77	326,300
Grapes:		ton	ton			ton	ton	
Toronto East	33	43	95.00	4,100	34	45	85.00	3,800
Toronto West	16,472	27,279	87.21	2,378,900	16,990	24,440	77.03	1,882,600
Total Province	16,505	27,322	87.22	2,383,000	17,024	24,485	77.04	1,886,400
Peaches:		bu.	bu.			bu.	bu.	
Toronto East	.....	....	....	....	.....	....	....	....
Toronto West	15,579	1,030,320	2.64	2,716,400	15,480	1,237,960	2.18	2,701,800
Total Province	15,579	1,030,320	2.64	2,716,400	15,480	1,237,960	2.18	2,701,800
Pears:		bu.	bu.			bu.	bu.	
Toronto East	158	4,740	3.35	15,900	170	5,700	2.65	15,100
Toronto West	5,938	214,733	1.72	369,700	6,359	498,375	1.68	835,700
Total Province	6,096	219,473	1.75	385,600	6,529	504,075	1.68	850,800

Plums and Prunes:		bu.	bu.			bu.	bu.	
Toronto East	234	9,680	2.86	27,700	60	4,450	1.75	7,800
Toronto West	4,969	285,825	2.74	784,300	5,727	348,375	1.19	415,000
Total Province	5,203	295,505	2.75	812,000	5,787	352,825	1.20	422,800
Raspberries:		qt.	qt.			qt.	qt.	
Toronto East	865	1,557,000	.35	543,000	770	1,210,300	.38	456,200
Toronto West	1,235	2,151,842	.37	802,400	1,280	2,202,800	.36	798,600
Total Province	2,100	3,708,842	.36	1,345,400	2,050	3,413,100	.30	1,254,800
Strawberries:		qt.	qt.			qt.	qt.	
Toronto East	967	2,127,400	.23	495,100	810	1,186,500	.34	397,800
Toronto West	2,689	7,942,454	.20	1,559,200	2,693	4,163,400	.23	961,300
Total Province	3,656	10,069,854	.20	2,054,300	3,503	5,349,900	.25	1,359,100
Total acreage and value of the above specified fruits—								
Toronto East	13,441	....	.....	2,625,700	12,999	....	.....	2,035,300
Toronto West	74,311	....	.....	12,655,400	84,894	....	.....	10,323,200
Total Province	87,752	....	.....	15,281,100	97,893	....	.....	12,358,500
Asparagus:		lb.	lb.			lb.	lb.	
Toronto East	324	648,000	.20	127,000	274	389,000	.19	74,800
Toronto West	1,739	3,942,000	.17	689,800	1,721	4,410,000	.18	775,300
Total Province	2,063	4,590,000	.18	816,800	1,995	4,799,000	.18	850,100
Beets (topped):		ton	ton			ton	ton	
Toronto East	292	2,920	25.23	73,700	249	2,143	37.00	79,300
Toronto West	1,137	13,203	27.29	360,300	1,129	12,410	31.69	393,300
Total Province	1,429	16,123	26.92	434,000	1,378	14,553	32.47	472,600
Cabbage:		ton	ton			ton	ton	
Toronto East	662	12,016	24.99	300,300	550	9,652	34.75	335,400
Toronto West	2,743	29,105	34.26	997,000	2,466	22,297	30.50	680,100
Total Province	3,405	41,121	31.55	1,297,300	3,016	31,949	31.78	1,015,500
Carrots (topped):		ton	ton			ton	ton	
Toronto East	753	10,542	25.50	268,800	685	6,289	37.53	236,000
Toronto West	1,838	26,359	32.94	868,400	1,677	22,075	32.34	714,000
Total Province	2,591	36,901	30.82	1,137,200	2,362	28,364	33.49	950,000
Cauliflower:		doz.	doz.			doz.	doz.	
Toronto East	247	91,390	1.75	159,900	212	77,325	2.15	166,200
Toronto West	938	514,525	1.51	778,300	909	418,200	1.46	610,900
Total Province	1,185	605,915	1.55	938,200	1,121	495,525	1.47	777,100

FINAL ESTIMATED PRODUCTION AND VALUE OF SPECIFIED COMMERCIAL FRUITS AND VEGETABLES IN ONTARIO FOR THE YEAR 1949 WITH COMPARATIVE FINAL FIGURES FOR THE YEAR 1948—Continued

Commodity and District	YEAR 1948				YEAR 1949			
	Total Acres	Total Production	Farm Selling Value per Unit $ c.	Total Farm Selling Value $	Total Acres	Total Production	Farm Selling Value per Unit $ c.	Total Farm Selling Value $
Celery:		crate	crate			crate	crate	
Toronto West	120	49,200	2.90	142,700	74	25,550	2.70	69,000
Toronto West	1,186	616,380	2.16	1,334,300	1,415	876,215	1.24	1,090,600
Total Province	1,306	665,580	2.22	1,477,000	1,489	901,765	1.28	1,159,600
Lettuce (head):		doz.	doz.			doz.	doz.	
Toronto East	214	278,200	.50	139,100	192	141,450	.80	113,200
Toronto West	1,584	1,539,450	.35	538,800	1,463	1,577,750	.39	615,300
Toronto Province	1,798	1,817,650	.37	677,900	1,655	1,719,200	.42	728,500
Mushrooms:		lb.	lb.			lb.	lb.	
Toronto East	.....	62,000	.40	24,600	......	47,000	.38	17,900
Toronto West	.....	1,112,000	.34	372,200	.....	1,394,000	.36	496,100
Total Province	.....	1,174,000	.34	396,800	.....	1,441,000	.36	514,000
Onions:		ton	ton			ton	ton	
Toronto East	546	5,460	58.00	316,700	591	4,535	53.00	240,400
Toronto West	3,968	50,504	55.39	2,797,700	4,094	44,292	57.98	2,568,000
Total Province	4,514	55,964	55.65	3,114,400	4,685	48,827	57.52	2,808,400
Parsnips:		ton	ton			ton	ton	
Toronto East	142	1,278	72.00	92,000	126	920	56.00	51,500
Toronto West	431	3,413	56.32	192,200	414	3,356	57.00	191,300
Total Province	573	4,691	60.58	284,200	540	4,276	56.78	242,800
Potatoes (Commercial only):		ton	ton			ton	ton	
Toronto East	29,595	177,570	28.37	5,038,400	27,130	129,650	20.07	2,602,700
Toronto West	46,822	308,000	36.28	11,175,000	49,260	265,183	33.57	8,900,900
Total Province	76,417	485,570	33.39	16,213,400	76,390	394,833	29.14	11,503,600
Spinach:		ton	ton			ton	ton	
Toronto East	66	393	90.00	35,400	56	316	90.00	28,400
Toronto West	696	4,121	61.36	252,900	717	4,166	51.04	212,600
Total Province	762	4,514	63.87	288,300	773	4,482	53.77	241,000

Tomatoes:		bu.	bu.			bu.	bu.	
Toronto East	11,374	2,468,000	.84	2,090,000	7,980	1,547,800	.86	1,330,700
Toronto West	40,665	10,584,944	.97	10,281,500	32,392	5,342,695	.92	4,901,300
Total Province	52,039	13,052,944	.95	12,371,500	40,372	6,890,495	.90	6,232,000
Turnips (table only):		ton	ton			ton	ton	
Toronto East	590	7,670	25.05	192,100	413	3,601	37.02	133,300
Toronto West	10,438	103,155	16.55	1,707,000	4,075	40,725	36.51	1,487,000
Total Province	11,028	110,825	17.14	1,899,100	4,488	44,326	36.55	1,620,300
Total acreage and value of the above specified vegetables—								
Toronto East	44,925	....	.....	9,000,700	38,532	....	.....	5,478,800
Toronto West	114,185	....	.....	32,345,400	101,732	....	.....	23,636,000
Total Province	159,110	....	.....	41,346,100	140,264	....	.....	41,474,000
Total acreage and value of the above specified fruits and vegetables—								
Toronto East	.....	....	.....	11,626,400	.....	....	.....	7,514,100
Toronto West	.....	....	.....	45,000,800	.....	....	.....	33,959,900
Total Province	.....	....	.....	56,627,200	.....	....	.....	41,474,000
Total Province:		ton	ton			ton	ton	
Canning Peas	.....	24,641	67.59	1,665,400	.....	10,718	61.17	655,600
Canning Corn	.....	48,266	22.45	1,083,400	.....	76,903	22.69	1,745,300
Processing Cucumbers	.....	8,986	50.26	451,600	.....	6,561	49.53	325,000
Processing Green and Wax Beans	.....	1,653	81.31	134,400	.....	1,548	84.30	130,500
		ton	ton					
Processing Pumpkin	.....	4,950	5.86	29,000	.....	849	6.96	5,900
Processing Lima Beans	.....	789	100.00	78,800	.....	1,189	92.01	109,400
Processing Peppers	.....	340	95.00	32,300	.....	653	94.18	61,500
Processing Rhubarb	.....	204	29.60	6,100	.....	303	30.36	9,200
*Total Value of all fruits and vegetables	.....	....	.....	68,469,000	.....	....	.....	59,229,000

*Estimates of total value prepared by the Agricultural Branch, Dominion Bureau of Statistics, Ottawa.

STATEMENT SHOWING 1949 CROP ONTARIO FRUITS AND VEGETABLES PURCHASED FOR PROCESSING PURPOSES BY ESTABLISHMENTS IN ONTARIO FOR THE ENTIRE SEASON OF 1949, WITH COMPARATIVE FIGURES FOR 1948

Commodity	Unit	Total Ontario Produce Entire 1948 Season			Total Ontario Produce Entire 1949 Season		
		Quantity Purchased	Unit Price $ c	Total Value $ c	Quantity Purchased	Unit Price $ c	Total Value $ c.
Apples	cwt.	220,900	1.46	321,912.92	514,256	1.14	585,451.28
Blackberries	qt.	3,672	.32	1,192.21	9,479	.44	4,165.48
Blueberries	lb.	241,616	.17	42,060.60	730,724	.14	102,054.75
Cherries, sour	lb.	9,355,421	.13	1,261,710.58	8,814,764	.12	1,061,578.80
Cherries, sweet	lb.	594,351	.15	86,924.02	678,763	.12	81,967.05
Crabapples	cwt	1,073	4.11	4,409.74	1,228	3.68	4,516.68
Currants, Black	lb.	255,409	.25	65,021.63	257,641	.27	69,097.70
Currants, red	lb.	249,309	.12	29,954.00	167,485	.11	18,637.90
Grapes	ton	18,185	78.07	1,419,789.59	14,524	75.00	1,089,364.96
Peaches	lb.	29,982,367	.05	1,445,945.68	44,935,436	.044	1,972,450.42
Pears, Bartlett	lb.	1,303,209	.05	62,750.96	9,822,253	.047	464,483.06
Pears, Kieffer	lb.	6,831,180	.03	196,274.67	13,000,427	.023	293,891.68
Pears, any other varieties	lb.	119,572	.03	3,437.70	....	....	....
Plums	lb.	2,971,926	.03	87,934.07	2,044,027	.029	59,440.95
Prunes	lb.	161,009	.04	6,821.16	158,379	.035	5,533.00
Raspberries, red	qt.	459,543	.31	140,682.76	802,218	.32	259,863.08
Raspberries, purple	qt.	220,228	.32	70,323.37	372,519	.39	146,030.09
Strawberries	qt.	5,453,628	.18	983,064.45	1,263,735	.20	258,659.98
Total Fruits				6,230,210.11			6,477,186.86
Asparagus	lb.	2,000,795	.19	372,451.45	2,340,968	.18	424,729.16
Beans, dry	lb.	12,849,012	.09	1,161,198.18	7,259,437	.07	500,224.64
Beans, green and wax	lb.	3,305,727	.04	134,421.90	3,095,807	.04	130,506.58
Beans, lima	lb.	1,578,851	.05	78,840.00	2,378,210	.05	109,419.76
Beets (topped)	ton	2,746	28.57	78,442.05	4,809	30.41	146,262.44
Cabbage	ton	3,842	15.49	59,521.07	3,792	13.42	50,886.69
Carrots (topped)	ton	8,992	23.61	212,289.43	6,613	33.38	220,763.37
Cauliflower	lb.	1,631,671	.03	42,072.08	1,349,578	0.26	35,470.92
Celery	lb.	2,516,144	.05	121,052.11	2,380,722	.03	74,665.36
Corn	ton	48,266	22.45	1,083,399.13	76,903	22.69	1,745,274.56
Cucumber	ton	8,986	50.26	451,642.57	6,561	49.53	324,977.27
Mushrooms	lb.	1,037,406	.33	346,246.75	1,198,038	.35	419,181.36

Onions	ton	2,058	59.98	123,448.28	2,128	72.44	154,155.03
Peas, dry	lb.	12,500	.06	750.00	276,800	.06	16,440.00
Peas, green, shelled	ton	24,641	67.59	1,665,397.98	10,718	61.17	655,610.50
Peppers	lb.	681,338	.05	32,328.49	1,306,908	.05	61,521.01
Potatoes	ton	3,280	39.62	129,943.38	4,672	37.78	176,529.20
Pumpkin	ton	4,950	5.86	28,987.61	849	6.96	5,905.33
Rhubarb	cwt.	4,090	1.48	6,044.28	6,050	1.52	9,206.79
Spinach	ton	932	23.10	21,535.09	1,258	25.01	31,462.45
Tomatoes	ton	353,658	26.27	9,291,676.24	164,061	23.63	3,876,531.40
Turnips	ton	178	27.34	4,866.93	225	39.33	8,848.73
Total Vegetables				15,446,555.00			9,178,572.55
Total Fruits and Vegetables				21,676,765.11			15,655,759.41

ACREAGE, PRODUCTION AND VALUE OF THE COMMERCIAL CROP OF LEAF TOBACCO IN ONTARIO, BY VARIETY, 1941-1949

Variety	Year	Harvested Acreage acres	Acreage Yield lb. per acre	Total Production lbs.	Average Farm Price c. per lb.	Gross Farm Value $
Flue-cured........	1941	48,930	1,461	71,526,700	22.8	16,308,100
	1942	58,400	1,156	67,483,500	26.5	17,883,100
	1943	55,700	983	54,754,700	30.2	16,539,900
	1944	68,800	1,200	82,595,000	30.7	25,389,000
	1945	72,344	982	71,056,000	34.9	24,799,000
	1946	85,852	1,339	114,992,000	36.67	42,172,000
	1947	98,146	848	83,206,000	37.34	31,069,000
	1948	85,200	1,151	98,072,000	42.70	41,877,000
	1949	86,252	1,324	114,161,000	42.25	48,234,000
Burley...........	1941	7,060	1,410	9,965,400	14.6	1,450,600
	1942	7,820	1,306	10,220,600	17.0	1,737,400
	1943	6,540	1,008	6,590,800	21.3	1,402,800
	1944	9,460	1,292	12,223,000	23.2	2,830,000
	1945	9,442	1,094	10,330,000	25.6	2,641,000
	1946	10,478	1,151	12,058,000	27.04	3,260,000
	1947	13,200	958	12,640,000	28.58	3,613,000
	1948	10,706	1,199	12,841,000	30.50	3,917,000
	1949	11,385	1,357	15,452,000	30.47	4,708,000
Dark............	1941	1,460	1,632	2,383,000	11.9	284,000
	1942	1,610	1,334	2,148,200	14.6	313,800
	1943	1,100	891	979,600	16.5	161,900
	1944	1,099	1,416	1,556,700	21.3	331,000
	1945	1,354	1,043	1,412,000	24.4	345,000
	1946	2,056	1,201	2,469,000	24.38	602,000
	1947	1,885	945	1,781,000	24.37	434,000
	1948	1,728	1,125	1,944,000	25.36	493,000
	1949	1,545	1,362	2,104,000	23.29	490,000
Total—Flue-cured Burley and dark tobacco........	1941	57,450	1,460	83,875,100	21.5	18,042,700
	1942	67,830	1,177	79,852,300	25.0	19,934,300
	1943	63,340	984	62,325,100	29.0	18,104,600
	1944	79,359	1,214	96,374,700	29.6	28,550,000
	1945	83,140	996	82,798,000	33.6	27,785,000
	1946	98,386	1,316	129,519,000	36.0	46,034,000
	1947	113,231	862	97,627,000	35.97	35,116,000
	1948	97,634	1,156	112,857,000	41.01	46,287,000
	1949	99,182	1,328	131,717,000	40.57	53,432,000

Due to a shortage of labour the tobacco companies in Ontario found it necessary to request the growers to undertake part of the primary stages of packing. The scale of payments made to growers for the years 1943-49 is shown below, and is not included in prices shown in the above table.

Year	Flue-cured c. per lb.	Burley c. per lb.	Dark c. per lb.
1943	1¼	...	...
1944	1½	1½	...
1945	1½	1½	...
1946	1½	1½	1½
1947	1½	1½	1½
1948	2	2	2
1949	2	2	2

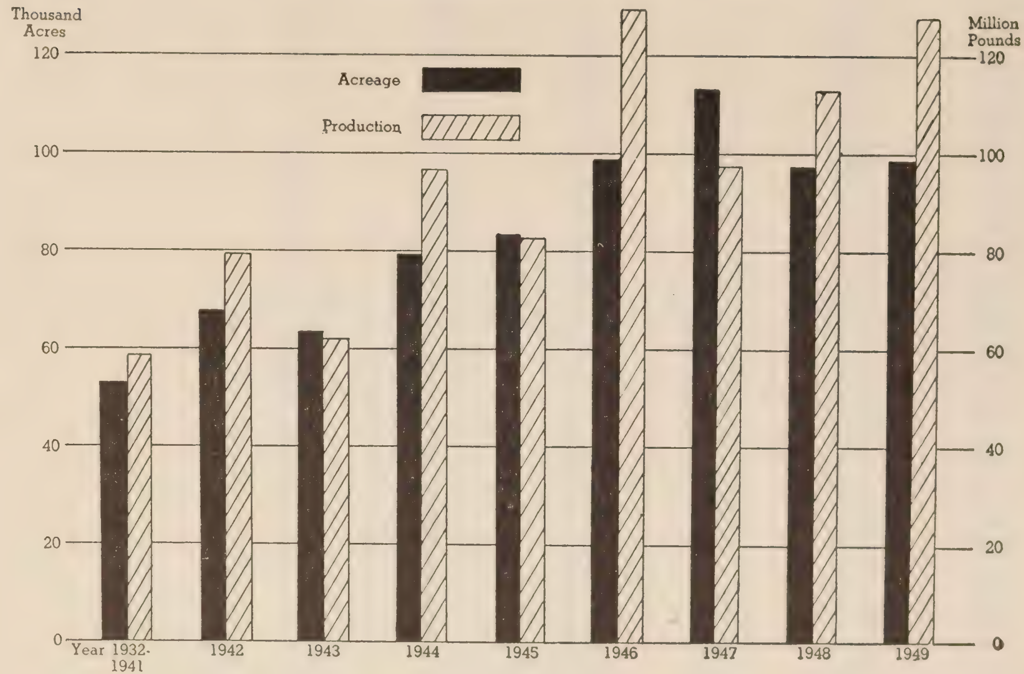
Acreage of
Flue-cured Tobacco
By County, Year 1949

Brant	6,980
Durham	1,540
Elgin	16,920
Kent	700
Lambton	330
Middlesex	4,450
Norfolk	44,542
Northumberland	20
Oxford	8,460
Simcoe	2,310
TOTAL	86,252

Acreage of Burley Tobacco
By County, Year 1949

Essex	4,062
Kent	6,902
Lambton	37
Middlesex	27
Norfolk	6
Elgin	350
Brant	1
TOTAL	11,385

ACREAGE AND PRODUCTION OF TOBACCO IN ONTARIO
10-YEAR AVERAGE 1932-41 AND ANNUALLY 1942-49.



RECEIVED BY FARMERS FOR FARM PRODUCTS, YEARS 1931 TO 1949

Year	Wheat per bus.	Oats per bus.	Barley per bus.	Rye per bus.	Flaxseed per bus.	Buckwheat per bus.
	c.	c.	c.	c.	$ c.	c.
1931	59.5	28.3	36.1	45.6	1.37	49.2
1932	54.4	30.0	39.6	43.8	1.08	43.7
1933	63.6	32.8	40.8	47.5	1.12	41.8
1934	84.5	41.3	52.1	58.9	1.29	53.2
1935	78.6	34.7	48.8	51.8	1.31	47.1
1936	84.1	37.5	54.2	56.1	1.45	50.0
1937	116.6	53.0	73.2	85.5	1.65	74.3
1938	76.2	40.7	52.2	59.4	1.46	56.4
1939	60.3	32.5	43.9	49.1	1.48	47.5
1940	69.7	36.2	48.3	56.7	1.46	52.2
1941	83.7	41.1	53.0	59.8	1.56	54.7
1942	96.8	48.9	61.5	68.1	1.84	64.2
1943	105.1	54.0	66.2	74.9	1.85	68.9
1944	108.9	57.7	70.7	87.0	1.85	75.9
1945	108.3	57.4	71.3	90.9	2.45	78.0
1946	114.6	58.0	73.6	134.9	2.64	80.1
1947	135.8	70.0	88.8	225.2	3.82	105.0
1948	178.2	90.1	117.0	220.5	4.48	119.1
1949	186.6	84.4	112.4	131.9	3.52	116.6

Year	Butterfat per lb.	Milk per lb.	Turnips per cwt.	Chickens, live weight per lb.	Eggs per dozen	Wool, unwashed per lb.
	c.	c.	c.	c.	c.	c.
1931	24.1	1.6	30.2	15.8	23.2	8.3
1932	18.9	1.1	26.9	12.9	19.3	5.8
1933	20.1	1.0	25.9	11.8	19.2	7.3
1934	21.3	1.2	29.0	12.9	22.4	10.9
1935	22.2	1.2	28.6	13.4	22.1	9.4
1936	23.8	1.3	28.9	14.7	23.8	13.7
1937	26.7	1.4	29.4	14.8	23.1	20.9
1938	27.8	1.4	33.8	16.0	24.4	12.1
1939	23.7	1.28	27.6	15.2	23.1	12.2
1940	26.2	1.38	30.6	14.8	23.4	21.2
1941	33.9	1.60	34.0	16.5	26.2	24.3
1942	37.4	2.17*	41.1	19.3	31.5	27.0
1943	42.4	2.40*	59.8	23.3	35.8	28.6
1944	43.1	2.52*	69.4	23.2	32.4	28.8
1945	43.8	2.53*	62.9	24.5	34.7	28.7
1946	47.8	2.69*	69.2	25.2	36.4	28.8
1947	54.8	3.14*	76.1	24.2	37.5	29.2
1948	71.2	3.70*	99.1	29.6	46.2	30.3
1949	61.8	3.69*	88.1	31.6	48.8	31.5

*Sold to Distributors

YEARLY AVERAGE PRICES RECEIVED BY FARMERS FOR FARM PRODUCTS, YEARS 1931 TO 1949

Year	Beef Cattle, live weight per cwt.	Milk Cows per head	Calves, live weight per cwt.	Sheep, live weight per cwt.	Lambs, live weight per cwt.	Hogs, live weight per cwt.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1931	5.14	58.25	6.83	3.99	7.24	6.84
1932	4.18	41.85	5.03	2.75	5.46	4.18
1933	3.54	35.46	4.85	2.49	5.40	4.94
1934	3.80	34.56	5.18	2.71	6.01	7.59
1935	4.59	38.40	5.84	2.78	6.37	7.99
1936	4.41	43.38	6.49	3.14	7.13	8.08
1937	5.63	48.87	7.29	3.61	7.88	8.62
1938	5.08	48.81	7.16	3.38	7.69	9.05
1939	5.60	50.20	7.51	3.45	7.90	8.47
1940	6.35	57.46	8.37	4.11	8.65	8.37
1941	7.21	66.56	9.32	4.41	9.53	9.36
1942	9.33	86.62	11.81	5.56	11.24	11.32
1943	10.45	112.00	13.26	6.88	12.64	12.55
1944	9.91	109.09	12.41	5.05	11.77	12.80
1945	10.50	110.79	12.64	4.98	12.11	13.81
1946	11.22	121.36	13.44	5.91	13.32	15.28
1947	12.37	125.70	14.25	6.36	14.12	17.18
1948	17.69	144.19	19.88	7.28	18.22	23.39
1949	19.14	159.40	22.25	8.71	21.78	25.36

Year	Hogs, dressed per cwt.	Horses per head	Potatoes per cwt.	Hay and Clover per ton	Alfalfa per ton	Honey per lb.
	$ c.	$ c.	c.	$ c.	$ c.	c.
1931	.....	91.67	80.4	10.39	11.05	9.3
1932	.....	80.80	55.1	8.47	8.82	7.9
1933	.....	83.22	96.7	8.14	8.12	7.9
1934	.....	93.78	95.2	12.96	13.14	9.3
1935	.....	103.73	69.1	10.67	11.48	9.7
1936	.....	114.77	145.3	7.51	7.85	9.6
1937	.....	123.60	102.8	7.89	8.16	10.0
1938	.....	119.15	72.4	7.59	7.60	10.0
1939	.....	111.64	115.5	7.32	7.70	9.5
1940	.....	104.56	116.8	7.80	8.54	10.2
1941	12.63	95.68	115.1	8.90	9.37	11.5
1942	15.02	98.87	178.4	11.38	11.84	13.3
1943	16.37	105.04	217.0	9.84	10.60	15.5
1944	16.86	96.59	197.5	10.43	11.08	16.5
1945	17.68	89.48	216.1	11.60	12.36	17.4
1946	19.52	90.10	240.2	11.14	12.20	18.4
1947	21.70	91.05	196.2	12.46	13.59	21.5
1948	29.56	84.59	250.2	13.97	15.94	25.4
1949	30.44	82.71	184.4	17.41	21.09	22.1

THE WEATHER

Temperature.—The following table gives the temperature of the Province for each month during the last five years, together with mean annual temperature for the six months, April-September, practically the growing season, together with the average for the five years, 1945-1949, and the sixty-eight years, 1882–1949.

Months	1949	1948	1947	1946	1945	1945–1949	1882–1949
	°	°	°	°	°	°	°
January	24.4	12.9	21.4	19.9	10.7	17.9	18.2
February	24.1	16.7	16.3	16.5	20.6	18.8	18.4
March	28.1	28.3	26.8	39.6	39.7	32.5	27.8
April	42.7	45.3	38.4	42.0	45.5	42.8	41.6
May	55.4	51.2	49.7	51.7	48.6	51.3	54.0
June	68.8	63.4	61.8	61.6	61.4	63.4	63.6
July	71.0	68.9	67.6	67.8	65.6	68.2	68.3
August	69.3	68.1	71.7	63.9	66.4	67.9	66.1
September	56.5	62.4	60.3	60.3	59.8	59.9	59.3
October	52.7	46.5	56.0	52.2	46.1	50.7	47.8
November	33.3	42.2	34.2	38.5	36.8	37.0	35.4
December	27.3	27.7	21.7	25.1	19.4	24.2	22.5
Annual Mean	46.1	44.4	43.8	44.9	43.3	44.5	43.6
Mean for six months April-September	60.6	59.9	58.2	57.9	57.8	58.9	58.8

The mean temperature for 1949 was 46.1 degrees or 1.7 degree above the preceding year and 2.5 degrees above the sixty-eight years 1882-1949.

The mean temperature for the six months, April-September, was 60.6 or 0.7 degrees above the preceding year, and 1.8 degree above normal.

Ten months were above normal and two below. January had the greatest departure above normal with 6.2 degrees, and September the greatest below with 2.8 degrees.

Sunshine.—In the following the averages of sunshine are derived from the records of weather stations at Woodstock, Toronto, Lindsay and Ottawa.

Months	Sun above horizon	1949	1948	1947	1946	1945	1945–1949	1882–1949
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
January	285.7	55.8	101.7	65.2	74.0	101.6	79.6	76.8
February	291.4	104.2	126.3	78.3	106.3	87.4	100.5	103.0
March	369.9	125.5	154.7	114.5	172.2	165.2	146.4	140.7
April	406.4	192.3	178.5	124.7	197.3	159.3	170.4	177.5
May	461.1	272.0	226.0	165.5	209.2	165.9	207.7	215.1
June	465.7	287.5	237.8	245.3	267.8	216.8	251.0	248.9
July	470.9	289.2	289.2	206.7	307.2	259.6	270.4	270.8
August	434.5	279.8	267.5	257.8	205.5	238.7	249.9	241.9
September	376.3	166.0	211.5	202.0	201.3	161.5	188.5	182.6
October	340.2	166.0	119.8	208.7	150.2	137.3	156.4	141.1
November	286.9	70.7	49.7	101.8	75.0	57.3	71.0	77.5
December	274.3	87.5	63.0	84.0	71.0	95.4	80.2	63.5
The year	4,465.1	2,096.5	2,025.7	1,854.5	2,037.0	1,846.0	1,972.0	1,939.4
For six months April-September	2,614.9	1,486.8	1,410.5	1,202.0	1,388.3	1,201.8	1,337.9	1,336.8

The year 1949 had 2,096.5 hours of sunshine or 157.1 hours more than the average for the sixty-eight years. The six growing months, April-September, had 1,486.8 or 150.0 hours above normal. Eight months were above normal and four below. May had the greatest departure above normal with 66.9 hours and January the greatest below with 21.0 hours.

PRECIPITATION

The rainfall for the six months, April-September, comprising what is the growing season for most crops, is given in the following table covering the last five years, 1945-1949, and the normal for the sixty-eight years, 1882-1949.

Months	1949	1948	1947	1946	1945	1945–1949	1882–1949
	in.	in.	in.	in.	in.	in.	in.
April	1.75	2.27	2.56	1.07	2.97	2.12	1.90
May	1.89	2.81	3.77	3.31	4.32	3.22	2.76
June	2.27	3.01	4.17	2.24	3.29	3.00	2.83
July	2.74	3.12	4.40	1.95	3.62	3.17	2.90
August	2.40	1.86	1.86	2.38	2.26	2.15	2.56
September	3.34	1.30	3.58	2.61	5.27	3.22	2.88
Total for six months	14.39	14.37	20.34	13.56	21.73	16.88	15.83

The rainfall for the six months, April-September, was 14.39 or 0.02 more than the preceding year, and in comparison with the sixty-eight years, 1.44 inches below. One month was above normal and five below. September with 0.46 above, and May with 0.87 below, had the greatest departures during the growing season.

PRECIPITATION.—The fall of both rain and snow for the five winter months including November, 1949, and March, 1950, is given in the following table for five years, together with the average for the sixty-nine years, 1882-1950. Ten inches of snow is equal to one inch of rain.

Months	1950	1949	1948	1947	1946	1946–1950	1882–1950
	in.	in.	in.	in.	in.	in.	in.
November, 1949:							
Rain	1.25	3.40	1.32	1.80	1.61	1.88	1.96
Snow	11.9	2.5	11.8	6.2	9.1	8.3	7.6
December, 1949:							
Rain	2.56	0.75	0.75	1.44	0.62	1.22	1.16
Snow	11.5	17.6	16.5	20.4	14.6	16.1	15.6
January, 1950:							
Rain	2.22	1.33	0.07	1.14	0.62	1.08	0.89
Snow	17.0	16.9	20.2	22.8	20.3	19.4	18.6
February, 1950:							
Rain	0.48	1.07	0.85	0.01	0.55	0.59	0.69
Snow	23.7	15.1	11.5	19.5	19.4	17.9	15.6
March, 1950:							
Rain	1.11	1.14	2.41	0.78	0.85	1.26	1.18
Snow	14.6	14.6	11.8	19.6	2.8	12.7	11.4
Five Months:							
Rain	7.62	7.69	5.40	5.17	4.25	6.03	5.88
Snow	78.7	66.7	71.8	88.5	66.2	74.3	68.8

The total amount of rainfall for the five months was 7.62 inches or 1.74 inches above the average for the sixty-nine years, 1882-1950. The total amount of snowfall was 78.7 or 9.9 above normal.

TEMPERATURES, 1949

Showing for each month the highest, lowest, mean daily range and mean temperature at the principal stations in Ontario for 1949; also the annual mean for each station.

Months	Southampton	Chatham	London	Woodstock	Vineland	Toronto	Lindsay	Beatrice	Ottawa	M'treal River
	°	°	°	°	°	°	°	°	°	°
January:										
Highest	52.8	54.0	52.2	53.1	47.0	52.0	57.0	45.0	47.2	46.0
Lowest	5.0	7.0	0.9	2.0	6.0	9.4	−2.8	−8.0	−7.9	−31.0
Daily range	11.5	10.3	11.8	12.6	12.4	11.7	17.9	17.9	16.1	25.9
Monthly mean	24.2	36.5	28.2	27.3	31.4	29.1	21.3	19.5	17.4	9.6
February:										
Highest	46.0	53.0	51.6	49.5	55.5	53.0	46.5	46.0	43.6	42.0
Lowest	3.9	10.0	2.0	−1.1	3.0	3.8	1.5	−11.0	−11.1	−34.0
Daily range	15.2	12.4	16.4	17.5	14.7	14.4	18.4	18.8	18.7	27.8
Monthly mean	25.3	30.2	26.4	25.2	30.7	29.3	22.8	21.4	18.8	10.8
March:										
Highest	66.0	70.0	67.9	69.0	68.9	64.8	57.8	51.0	46.8	51.8
Lowest	4.0	11.0	8.5	3.1	8.0	9.7	−6.8	−20.0	−10.0	−33.0
Daily range	13.9	14.8	15.4	16.1	14.0	13.7	19.5	19.3	15.9	28.4
Monthly mean	29.5	35.1	31.0	29.9	34.2	32.4	25.6	23.2	24.3	15.6
April:										
Highest	68.0	74.0	75.0	74.8	70.0	74.9	76.0	76.0	72.9	78.0
Lowest	21.0	25.0	21.0	23.2	26.0	28.0	20.0	15.0	25.1	11.0
Daily range	16.7	19.0	22.2	21.4	16.1	17.1	24.0	23.0	20.0	22.5
Monthly mean	40.2	45.8	42.7	43.2	45.1	45.7	41.9	40.9	42.7	38.6
May:										
Highest	86.0	89.0	88.0	85.3	91.0	88.6	85.0	82.0	83.0	83.0
Lowest	28.0	34.0	32.0	31.0	35.0	36.9	25.0	23.0	29.9	22.0
Daily range	20.0	20.4	24.3	23.3	22.2	21.9	26.4	25.4	23.4	27.5
Monthly mean	53.3	60.3	57.2	56.1	57.5	58.0	54.6	52.6	55.0	49.4
June:										
Highest	87.0	92.0	91.0	90.0	94.0	93.8	89.0	90.0	90.6	90.0
Lowest	30.0	36.0	31.7	32.8	40.0	39.2	34.0	29.0	40.0	28.0
Daily range	20.8	20.0	23.7	24.4	21.8	21.7	24.9	25.0	21.4	23.7
Monthly mean	66.5	72.3	69.6	68.7	70.9	72.0	68.0	66.9	68.8	64.2
July:										
Highest	90.2	96.0	95.0	92.1	96.0	93.1	92.5	90.0	95.7	89.0
Lowest	48.0	53.0	48.8	44.0	51.3	53.5	46.0	40.0	50.8	40.0
Daily range	21.2	17.5	20.7	21.2	17.6	19.0	23.4	25.4	24.6	28.4
Monthly mean	70.5	75.2	72.2	70.7	73.9	73.5	69.7	67.2	72.1	65.1
August:										
Highest	94.0	93.0	93.0	91.3	98.0	98.9	92.0	89.0	96.8	98.0
Lowest	40.0	50.0	42.7	42.5	52.0	49.8	42.0	40.0	46.2	37.0
Daily range	24.7	18.7	24.1	24.0	19.5	20.2	25.3	26.8	24.1	26.5
Monthly mean	69.8	72.1	69.2	69.3	72.5	72.7	68.3	65.4	70.2	64.0
September:										
Highest	88.0	84.0	83.2	82.7	84.0	82.7	81.0	83.0	83.0	78.0
Lowest	37.0	38.0	33.8	32.4	40.0	38.1	28.0	26.0	33.9	29.0
Daily range	19.2	16.1	19.3	19.5	17.4	17.7	19.0	19.5	17.9	23.1
Monthly mean	58.5	59.3	56.7	55.9	60.3	58.7	55.2	53.9	56.1	50.7
October:										
Highest	81.0	84.0	81.2	80.9	85.0	79.3	80.0	79.0	81.1	75.0
Lowest	26.2	27.2	24.5	24.4	27.3	28.2	21.7	20.1	23.7	17.2
Daily range	20.9	16.7	21.6	21.8	18.7	16.6	21.8	22.1	21.3	25.6
Monthly mean	53.2	57.2	53.2	52.8	55.6	55.4	51.9	50.0	50.7	47.0
November:										
Highest	61.8	64.0	63.2	62.6	64.0	62.1	59.0	58.0	54.2	45.0
Lowest	5.4	14.0	4.8	4.1	15.0	4.5	−5.0	−6.0	−2.0	−6.0
Daily range	12.9	10.4	12.7	14.2	12.1	11.8	15.9	13.7	13.3	15.4
Monthly mean	35.6	39.4	34.3	34.2	38.7	36.7	31.5	29.1	29.2	24.8
December:										
Highest	59.0	58.0	56.2	54.3	61.0	56.9	55.0	52.0	56.6	51.0
Lowest	8.0	12.0	4.0	5.3	13.0	12.9	−9.0	−12.0	−10.9	−16.0
Daily range	14.2	10.9	14.7	14.4	13.5	11.9	17.1	15.5	15.4	21.7
Monthly mean	29.1	33.6	29.3	29.1	33.5	32.0	25.6	22.9	22.2	15.3
The Year	46.3	51.4	47.5	46.9	50.4	49.6	44.7	42.7	44.0	37.9

AVERAGE TEMPERATURE FOR SIXTY-EIGHT YEARS

Showing for each month the monthly average for the highest, lowest, mean daily range and mean temperature at the principal stations in Ontario, derived from the sixty-eight years, 1882-1949; also the annual mean at each station for the same period.

Months	Southampton	Chatham	London	Woodstock	Vineland	Toronto	Lindsay	Beatrice	Ottawa	M'treal River
	°	°	°	°	°	°	°	°	°	°
January:										
Highest	44.1	46.9	45.8	45.4	49.3	45.6	41.5	40.4	40.7	38.4
Lowest	−7.2	−5.8	−8.3	−9.1	−3.1	−5.8	−19.2	−26.8	−20.8	−35.2
Daily range	13.9	13.4	14.6	15.0	13.8	14.1	17.9	20.2	17.6	25.6
Monthly mean	20.9	23.1	21.7	20.7	25.3	23.1	15.9	14.0	11.9	5.5
February:										
Highest	43.8	49.4	46.2	45.2	48.6	45.5	41.9	41.3	40.5	41.0
Lowest	−10.8	−5.7	−8.8	−8.7	−3.5	−5.4	−17.3	−25.5	−19.2	−35.1
Daily range	16.8	13.9	15.9	16.7	21.5	14.5	19.4	21.5	18.9	26.6
Monthly mean	19.4	22.7	20.9	21.3	27.3	22.2	15.4	13.8	13.0	8.0
March:										
Highest	55.5	61.3	60.3	58.1	60.8	57.7	53.6	51.3	50.5	51.8
Lowest	−1.6	4.1	1.6	1.5	7.1	5.6	−6.1	−13.0	−7.3	−23.4
Daily range	16.4	15.0	17.1	16.0	14.6	14.3	18.5	20.5	17.3	26.1
Monthly mean	27.6	31.9	30.5	29.0	32.9	30.8	26.2	24.0	25.1	20.0
April:										
Highest	72.3	77.1	75.9	74.0	76.6	71.9	74.2	71.7	73.8	72.5
Lowest	16.9	20.5	19.2	18.4	21.8	22.1	14.9	10.6	16.1	4.1
Daily range	17.2	18.6	20.1	19.2	17.0	16.5	21.0	21.2	19.4	24.7
Monthly mean	40.2	44.6	43.1	42.3	44.0	43.0	41.2	39.1	41.2	36.9
May:										
Highest	79.6	84.2	83.3	80.9	84.6	81.3	82.8	80.9	83.1	84.3
Lowest	28.4	30.6	29.2	29.2	32.9	32.7	27.6	25.5	30.6	19.9
Daily range	19.0	21.1	22.5	21.5	20.1	19.3	23.8	23.6	21.7	27.5
Monthly mean	50.8	56.0	54.9	58.6	54.5	54.4	53.7	51.9	54.8	50.6
June:										
Highest	85.3	90.2	89.3	86.7	90.8	88.4	89.2	86.8	88.7	89.8
Lowest	37.2	39.6	38.2	38.8	41.7	42.5	38.0	34.7	40.9	32.1
Daily range	19.8	21.6	22.0	21.5	20.7	20.1	24.5	24.7	21.6	38.2
Monthly mean	60.5	66.0	65.4	63.6	65.2	64.6	63.6	61.7	64.7	60.6
July:										
Highest	87.8	93.7	92.6	90.0	93.0	91.8	92.1	89.4	91.4	91.9
Lowest	44.2	46.1	44.4	44.6	48.2	49.4	43.8	41.3	47.4	38.7
Daily range	19.8	22.0	23.1	22.2	20.7	20.0	24.5	24.0	21.0	28.9
Monthly mean	66.3	70.8	69.4	67.5	71.0	54.8	67.8	66.1	69.1	65.5
August:										
Highest	86.7	91.7	91.1	88.8	93.1	90.0	90.3	87.6	89.6	88.6
Lowest	42.4	44.7	41.6	42.1	46.4	47.4	40.8	37.4	43.6	35.6
Daily range	18.9	21.1	23.0	22.6	20.0	20.9	24.5	23.7	21.4	26.3
Monthly mean	65.1	68.8	67.2	65.9	69.2	67.3	65.3	63.9	66.6	61.9
September:										
Highest	84.7	87.2	87.2	85.0	89.0	86.0	85.4	83.0	85.1	83.5
Lowest	34.6	35.6	32.6	32.8	36.6	37.3	31.5	29.2	33.1	27.7
Daily range	18.4	19.7	22.2	20.9	19.5	18.5	22.5	21.6	19.7	24.3
Monthly mean	59.3	62.5	60.7	59.4	62.6	60.9	58.3	56.8	58.3	54.3
October:										
Highest	74.8	77.6	76.1	74.5	77.7	74.5	74.3	72.4	74.4	72.7
Lowest	26.2	27.2	24.5	24.4	27.3	28.2	21.7	20.1	23.7	17.2
Daily range	16.3	17.7	19.7	18.6	18.1	16.2	20.0	19.2	18.1	20.2
Monthly mean	48.4	50.9	48.8	48.8	51.0	49.4	46.5	45.0	46.3	42.8
November:										
Highest	61.9	64.3	62.7	61.9	65.9	61.4	60.0	58.9	54.3	56.2
Lowest	14.6	15.8	13.5	13.1	18.1	16.6	6.8	5.1	7.3	−2.3
Daily range	13.0	12.5	12.9	14.0	13.4	12.6	15.4	14.9	13.2	15.7
Monthly mean	37.0	38.6	36.2	36.1	39.8	38.2	34.0	32.8	32.8	28.6
December:										
Highest	48.7	50.3	51.3	48.5	52.8	49.0	45.7	44.3	43.4	42.7
Lowest	0.2	2.0	−2.1	−2.7	1.8	0.3	−13.1	−17.0	−15.2	−25.8
Daily range	12.6	10.9	13.1	13.1	12.4	12.2	16.0	16.7	14.8	20.0
Monthly mean	26.5	27.6	26.3	25.1	29.3	27.8	21.2	19.9	17.9	13.4
12 Months	43.5	47.0	45.4	44.9	47.7	46.0	42.4	40.7	41.8	37.3

RAIN AND SNOW

Summary of the total fall of rain and snow and the number of days on which rain and snow fell in Ontario during 1949, at stations reporting the whole year, and the average of the Province.

Stations	Rain		Snow	
	Inches	Days	Inches	Days
Algoma:				
Biscotasing	20.56	85	114.5	55
Franz	In	com	plete	
Kapuskasing	11.11	63	167.7	85
Steep Hill Falls	In	com	plete	
Brant:				
Brantford	24.81	106	50.4	32
Paris	In	com	plete	
Bruce:				
Southampton	23.04	107	99.9	48
Tobermory	22.15	60	80.0	36
Walkerton	16.99	87	79.5	40
Carleton:				
Ottawa	24.50	101	66.7	52
Durham:				
Orono	27.01	95	41.2	36
Elgin:				
St. Thomas	26.68	100	44.0	29
Essex:				
Harrow	27.98	99	10.0	12
Leamington	31.95	106	19.6	20
Frontenac:				
Kingston	25.96	107	60.1	38
Grey:				
Eugenia	20.47	58	102.0	42
Halton:				
Georgetown	23.99	88	59.3	21
Hastings:				
Belleville	24.66	106	6.51	39
Trenton	28.94	96	57.9	28
Huron:				
Brucefield	26.72	81	78.8	39
Lucknow	25.31	50	108.5	41
Ridgecrest	32.01	82	77.0	37
Kenora:				
Ignace	18.91	66	105.8	40
Kenora	13.57	73	97.4	83
Sioux Lookout	18.04	107	101.9	105
Kent:				
Chatham	29.76	105	32.3	23
Leeds:				
Brockville	29.40	111	90.0	33
Lincoln:				
St. Catharines	22.52	96	33.6	19
Vineland	26.49	104	41.5	31
Manitoulin:				
Providence Bay	In	com	plete	
Middlesex:				
London	32.83	113	66.2	50
Lucan	In	com	plete	
Muskoka:				
Beatrice	28.89	112	151.2	60
Nipissing:				
Algonquin Park	16.35	80	107.3	52
Haileybury	20.51	105	103.9	71
Iroquois Falls	19.64	89	111.6	74
Madawaska	18.35	65	73.0	31
Montreal River	23.38	110	87.8	68
North Bay	27.86	95	80.9	57
Rutherglen	In	com	plete	
Norfolk:				
Simcoe	35.26	67	48.0	23
Northumberland:				
Healey's Falls	In	com	plete	
Oxford:				
Woodstock	25.94	107	44.0	32
Parry Sound:				
Magnetawan	24.56	100	115.2	61
Parry Sound	27.93	102	78.6	59
Peel:				
Alton	In	com	plete	
Perth:				
Startford	29.72	62	90.3	46
Peterborough:				
Apsley	29.11	109	81.6	53
Lakefield	In	com	plete	
Peterborough	20.43	71	51.0	34
Rainy River:				
Atikokan	19.20	53	49.9	34
Emo	23.83	88	58.3	35
Fort Frances	In	com	plete	
Mine Centre	25.64	101	86.5	61
Renfrew:				
Clontarf	18.65	48	68.7	25
Pembroke	14.45	68	79.4	42
Renfrew	In	com	plete	
Simcoe:				
Beeton	25.15	81	75.7	28
Orillia	23.70	81	89.3	51
Washago	23.64	67	66.1	42
Sudbury:				
Chapleau	17.97	72	104.8	50
Coniston	17.33	96	76.1	52
Timmins	13.16	64	77.3	46
Thunder Bay:				
Kakabeka Falls	19.21	77	72.1	47
Port Arthur	19.08	84	91.8	67
Savanne	In	com	plete	
Schreiber	21.62	62	86.0	42
Victoria:				
Fenelon Falls	25.32	90	56.2	35
Lindsay	30.11	106	44.6	26
Waterloo:				
Kitchener	29.72	62	55.5	22
Welland:				
Welland	28.11	107	63.9	44
Wellington:				
Guelph	23.64	86	57.8	42
York:				
Agincourt	20.85	84	59.4	37
Toronto	19.74	111	51.1	31
Average for the Province 1949	24.15	86	72.7	44
1948	24.44	93	66.5	42
1947	25.36	85	97.1	56
1882–1949	24.30	86	73.7	42

RAIN AND SNOW

Monthly summary of inches of rain and snow in precipitation in the several districts in Ontario in 1949; also the average derived from the sixty-eight years, 1882-1949.

Months	West and Southwest		North and Northwest		Centre		East and Northeast		The Province	
	Rain	Snow	Rain	Snow	Rain	Snow	Rain	Snow	Rain	Snow
1949	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January	2.08	12.6	0.52	23.3	1.67	14.5	1.05	17.3	1.33	16.9
February	1.74	12.0	0.08	19.5	1.38	13.2	1.09	15.6	1.07	15.1
March	1.61	13.5	0.57	17.0	1.34	14.6	1.02	13.4	1.14	14.6
April	1.55	1.2	0.70	1.8	1.84	2.0	2.93	2.7	1.75	1.9
May	1.71	......	2.12	0.4	1.65	......	2.07	......	1.89	0.1
June	2.45	......	3.74	......	1.32	......	1.55	......	2.27	......
July	3.13	......	3.15	......	2.63	......	2.04	......	2.74	......
August	2.52	......	2.42	......	2.32	......	2.33	......	2.40	......
September	3.23	......	2.68	Trace	2.57	......	3.87	......	3.34	Trace
October	2.63	0.1	2.69	2.2	2.51	0.4	1.84	......	2.41	0.7
November	0.97	11.5	0.66	13.5	1.65	10.6	1.72	11.9	1.25	11.9
December	3.53	11.9	0.64	12.8	3.36	13.4	2.72	7.9	2.56	11.5
The Year	27.15	62.8	19.97	90.5	25.24	68.7	24.23	68.8	24.15	72.7
Average Years 1882–1949										
January	1.13	16.5	0.43	21.5	1.01	17.2	0.93	19.3	0.87	18.6
February	1.03	13.9	0.29	17.3	0.83	14.4	0.63	16.4	0.69	15.5
March	1.43	9.2	0.71	13.5	1.36	10.5	1.24	12.1	1.19	11.3
April	2.19	2.5	1.46	5.1	2.07	3.3	1.87	3.7	1.90	3.7
May	3.04	0.1	2.44	0.4	2.81	0.1	2.75	0.1	2.76	0.2
June	2.95	......	2.87	Trace	2.75	......	2.76	......	2.83	Trace
July	2.77	......	3.05	......	2.88	......	2.90	......	2.90	......
August	2.65	......	2.86	......	2.43	......	2.28	......	2.56	......
September	2.83	Trace	3.19	Trace	2.73	......	2.78	Trace	2.88	Trace
October	2.69	0.8	2.62	2.5	2.60	0.7	2.48	0.9	2.60	1.2
November	2.22	6.0	1.57	11.7	2.06	5.8	1.99	7.0	1.96	7.6
December	1.73	14.5	0.59	19.3	1.19	13.7	1.12	14.8	1.16	15.6
12 Months	26.66	63.5	22.08	91.3	24.72	65.7	23.73	74.3	24.30	73.7

SUNSHINE

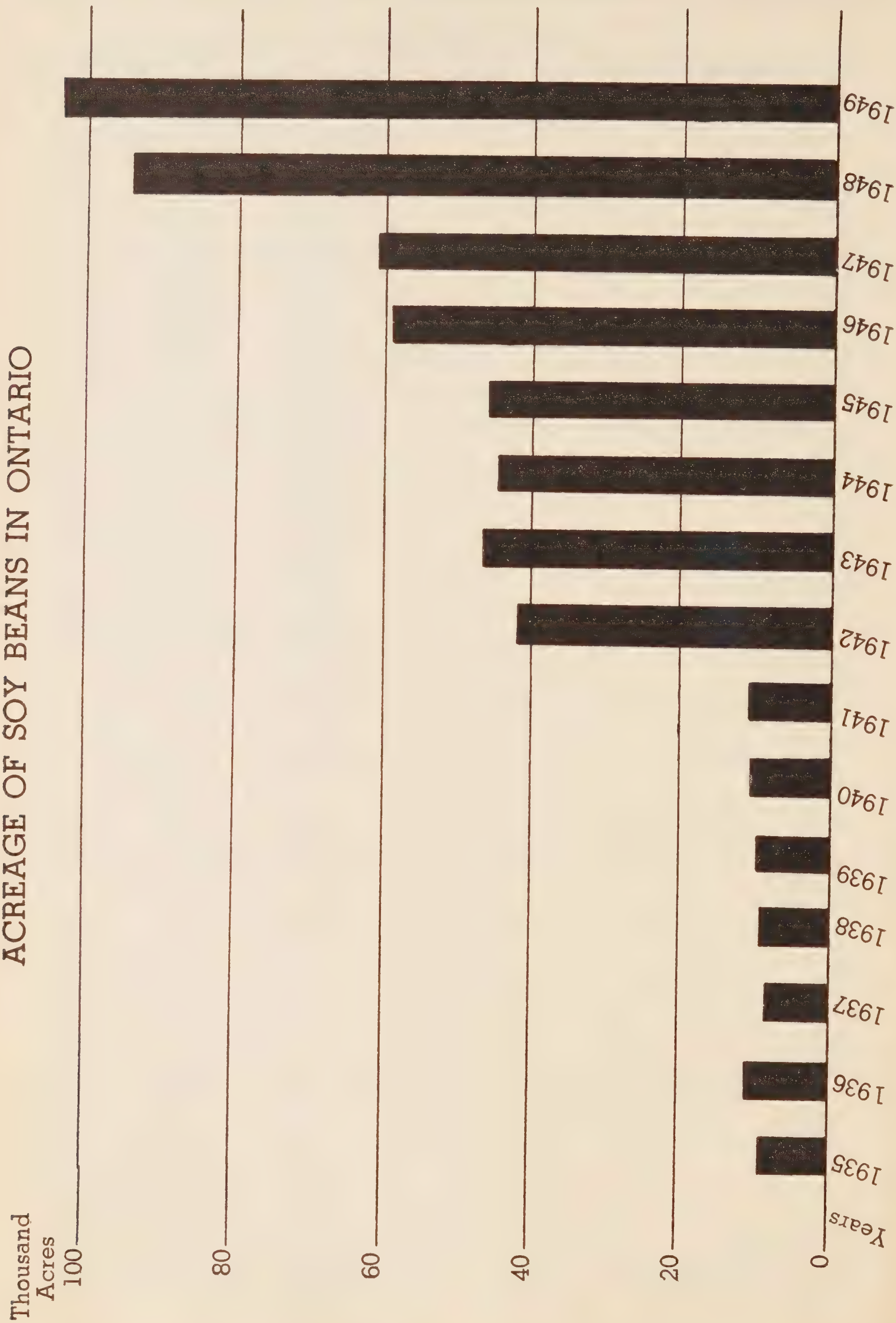
Monthly summary of bright sunshine at the principal stations in Ontario for 1949 showing the number of hours the sun was above the horizon, the hours of registered sunshine, the total for the year and average derived from the sixty-eight years 1882-1949.

Months	Sun above horizon	Woodstock	Toronto	Lindsay	Ottawa	Average of four stations		
						1949	1948	1882–1949
1949	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
January	285.7	55.0	46.0	56.0	66.0	55.8	101.7	....
February	291.4	107.0	106.0	97.0	107.0	104.2	126.3	....
March	369.9	137.0	121.0	107.0	137.0	125.5	154.7	....
April	406.4	214.0	193.0	173.0	189.0	192.3	178.5	....
May	461.1	302.0	275.0	260.0	251.0	272.0	226.0	....
June	465.7	314.0	311.0	291.0	234.0	287.5	237.8	....
July	470.9	292.0	276.0	279.0	310.0	289.2	289.2	....
August	434.5	299.0	296.0	245.0	279.0	279.8	267.5	....
September	376.3	189.0	186.0	154.0	135.0	166.0	211.5	....
October	340.2	199.0	162.0	151.0	152.0	166.0	119.8	....
November	286.9	79.0	74.0	62.0	68.0	70.7	49.7	....
December	274.3	108.0	102.0	62.0	78.0	87.5	63.0	....
The Year	4,465.1	2,295.0	2,148.0	1,937.0	2,006.0	2,096.5	2,025.7	....
Average Years 1882–1949								
January	....	65.5	77.5	73.7	90.6	....	....	76.8
February	....	92.9	106.2	100.0	112.9	....	....	103.0
March	....	126.5	147.8	140.0	148.6	....	....	140.7
April	....	167.8	184.3	171.5	186.2	....	....	177.5
May	....	215.2	222.7	203.9	218.4	....	....	215.1
June	....	255.3	262.7	232.6	245.1	....	....	248.9
July	....	279.1	286.1	250.2	267.8	....	....	270.8
August	....	240.3	255.1	225.9	246.5	....	....	241.9
September	....	178.3	202.5	174.5	175.1	....	....	182.6
October	....	147.3	152.8	129.7	134.7	....	....	141.1
November	....	75.8	83.2	70.1	80.8	....	....	77.5
December	....	56.8	67.1	60.1	70.1	....	....	63.5
12 Months	....	1,900.8	2,048.0	1,832.2	1,976.8	....	....	1,939.4

RURAL AREA ASSESSED

Showing by County Municipalities the rural area of Ontario as returned by Municipal Assessors for 1949 to the Ontario Department of Municipal Affairs.

Counties and Districts	Assessed Area 1949 (acres)	Cleared Farm acreage 1949 (acres)	Per cent cleared
Brant	204,817	167,954	82.20
Elgin	433,622	368,083	84.89
Essex	415,755	383,902	93.34
Haldimand	280,215	245,256	87.52
Kent	567,197	510,060	89.93
Lambton	662,623	559,195	84.39
Lincoln	186,943	166,533	89.08
Middlesex	780,247	660,709	84.70
Norfolk	392,747	267,552	68.12
Oxford	468,018	407,899	87.15
Welland	217,563	189,392	87.05
Wentworth	261,742	210,598	80.46
Southern Ontario Total	**4,871,489**	**4,137,133**	**84.93**
Bruce	921,758	603,381	65.46
Dufferin	355,217	290,295	81.72
Grey	1,044,979	738,508	70.67
Halton	223,959	193,264	86.29
Huron	791,214	688,839	87.06
Peel	291,798	263,045	90.15
Perth	517,158	460,561	89.06
Simcoe	938,487	688,742	73.39
Waterloo	305,267	253,113	82.92
Wellington	624,951	519,178	83.07
Western Ontario Total	**6,014,788**	**4,698,926**	**78.12**
Durham	365,581	312,212	85.40
Haliburton	490,443	46,935	9.57
Hastings	1,056,226	402,551	38.11
Muskoka	612,523	85,423	13.95
Northumberland	433,998	345,918	79.70
Ontario	498,542	379,501	76.12
Parry Sound	592,798	105,072	17.72
Peterborough	560,140	290,057	51.78
Prince Edward	233,878	202,821	86.72
Victoria	584,194	308,327	52.78
York	515,044	392,059	76.12
Central Ontario Total	**5,943,367**	**2,870,876**	**48.30**
Carleton	551,954	379,396	68.74
Dundas	235,425	194,747	82.72
Frontenac	669,935	288,980	43.14
Glengarry	288,452	223,715	77.56
Grenville	266,489	181,230	67.50
Lanark	670,501	336,269	50.15
Leeds	458,277	256,584	55.99
Lennox and Addington	419,883	259,034	61.69
Prescott	287,866	230,822	80.18
Renfrew	1,059,770	406,935	38.40
Russell	235,281	183,159	77.85
Stormont	243,677	134,999	55.40
Eastern Ontario Total	**5,387,510**	**3,075,870**	**57.09**
Algoma	323,200	74,707	23.11
Cochrane	368,877	70,651	19.15
Kenora	93,231	15,118	16.22
Manitoulin	370,852	53,840	14.52
Nipissing	288,511	67,701	23.47
Rainy River	385,609	73,470	19.05
Sudbury	455,787	100,749	22.10
Thunder Bay	414,771	74,682	18.01
Timiskaming	300,151	93,517	31.16
Northern Ontario Total	**3,000,989**	**624,435**	**20.81**
The Province, 1948	**25,218,143**	**15,407,240**	**61.10**


ACREAGE OF SOY BEANS IN ONTARIO
Thousand Acres
100
80
60
40
20
0
Years
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949

PRODUCTION AND FARM VALUE OF PRINCIPAL FIELD CROPS IN ONTARIO, YEAR 1949

Field Crops	Acres	Yield per Acre	Production Bushels	Farm Value Total	Farm Value Per Acre
		bus.		$	$
Fall Wheat	805,000	30.7	24,714,000	42,755,000	53.11
Spring Wheat	59,000	18.0	1,062,000	1,837,000	31.14
Oats	2,086,000	34.5	71,967,000	56,134,000	26.91
Barley	228,000	30.3	6,908,000	8,082,000	35.45
Peas, dry	25,400	15.4	391,000	966,000	38.03
Beans, dry	80,900	19.5	1,578,000	5,239,000	64.76
Mixed Grains	1,211,000	35.3	42,748,000	39,328,000	32.48
Rye	106,000	21.0	2,226,000	2,960,000	27.92
Buckwheat	72,200	20.9	1,509,000	1,766,000	24.45
Flax	16,500	11.9	196,000	647,000	39.21
Soy Beans	103,800	25.1	2,605,000	5,887,000	56.71
Corn (shelled)	250,000	52.4	13,100,000	16,244,000	64.98
Potatoes	117,000	160.0	18,720,000	21,341,000	182.40
Field Roots	48,800	304.0	14,836,000	8,160,000	167.21
		Tons	Tons		
Corn (fodder)	418,000	10.0	4,180,000	24,244,000	58.00
Hay and Clover	2,951,000	1.25	3,689,000	72,304,000	24.50
Alfalfa	802,000	1.78	1,428,000	31,416,000	39.17
Sugar Beets	30,000	11.18	335,400	4,630,000	154.33
All Field Crops, including Sugar Beets	9,410,600	......	....	343,940,000	36.55

PRODUCTION AND FARM VALUE OF PRINCIPAL FIELD CROPS IN ONTARIO, YEAR 1948

Field Crops	Acres	Yield per Acre	Production Bushels	Farm Value Total	Farm Value Per Acre
		bus.		$	$
Fall Wheat	858,500	30.3	26,013,000	53,847,000	62.72
Spring Wheat	52,300	22.2	1,161,000	2,403,000	45.95
Oats	1,835,600	41.8	76,728,000	62,917,000	34.28
Barley	226,100	34.4	7,778,000	8,634,000	38.19
Peas, dry	29,700	21.9	650,000	1,859,000	62.59
Beans, dry	78,300	17.9	1,402,000	5,762,000	73.59
Mixed Grains	1,095,900	43.5	47,672,000	45,288,000	41.32
Rye	123,900	22.2	2,751,000	4,182,000	33.75
Buckwheat	91,700	20.1	1,843,000	2,119,000	23.11
Flax	64,300	12.9	829,000	3,150,000	48.99
Soy Beans	94,000	19.4	1,824,000	4,195,000	44.63
Corn (shelled)	242,400	50.0	12,120,000	15,998,000	66.00
Potatoes	115,300	176.6	20,370,000	24,077,000	208.82
Field Roots	51,900	376.0	19,514,000	8,586,000	165.43
		Tons	Tons		
Corn (fodder)	401,600	9.95	3,996,000	21,099,000	52.54
Hay and Clover	3,026,500	1.90	5,750,000	82,800,000	27.36
Alfalfa	732,200	2.49	1,823,000	29,168,000	39.84
Sugar Beets	18,400	10.70	197,000	2,817,000	153.10
All Field Crops, including Sugar Beets	9,138,600	......	....	378,901,000	41.46

FALL WHEAT AND SPRING WHEAT

Showing by County Municipalities of Ontario the area, production and farm value of Fall Wheat and Spring Wheat for the year 1949.

Counties and Districts	Fall Wheat				Spring Wheat			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	17,600	30.9	544,600	942,200	920	18.0	16,600	28,400
Elgin	43,400	33.0	1,430,200	2,474,200	100	18.0	1,800	3,100
Essex	42,600	33.0	1,403,800	2,428,600	1,700	20.0	34,000	58,100
Haldimand	26,200	30.0	785,000	1,358,000	1,280	19.0	24,300	41,600
Kent	66,500	33.0	2,191,500	3,791,300	2,200	20.0	44,000	75,200
Lambton	70,200	35.0	2,454,400	4,245,400	1,100	19.0	20,900	35,700
Lincoln	12,300	29.0	356,700	617,100	220	17.0	3,700	6,300
Middlesex	50,000	35.0	1,750,000	3,027,500	2,680	20.0	52,900	90,500
Norfolk	18,000	29.0	522,000	903,100	600	20.0	12,000	20,500
Oxford	19,600	33.0	646,800	1,118,900	600	20.0	12,000	20,500
Welland	14,100	28.0	394,800	683,000	300	20.0	6,000	10,300
Wentworth	15,600	30.0	468,000	809,600	100	19.0	1,900	3,200
Southern Ontario	**396,100**	**32.7**	**12,947,800**	**22,398,900**	**11,800**	**19.5**	**230,100**	**393,400**
Bruce	24,400	30.0	732,000	1,266,400	2,300	17.0	39,100	66,900
Dufferin	5,900	28.0	165,200	285,800	1,000	17.0	17,000	29,000
Grey	21,800	27.0	588,600	1,018,300	3,800	20.0	72,180	122,900
Halton	16,800	29.0	487,200	842,900	400	12.0	4,800	8,200
Huron	38,600	30.0	1,158,000	2,003,300	1,300	17.0	22,100	37,800
Peel	20,200	31.0	626,200	1,083,300	300	13.0	3,900	6,700
Perth	22,900	31.0	709,900	1,228,800	1,400	21.0	29,400	50,300
Simcoe	55,700	26.0	1,448,150	2,505,300	2,600	17.0	43,200	73,900
Waterloo	22,400	29.0	649,600	1,123,800	900	14.0	12,600	21,500
Wellington	20,100	31.0	623,100	1,077,900	1,700	17.0	28,900	49,400
Western Ontario	**248,800**	**28.9**	**7,187,950**	**12,435,800**	**15,700**	**17.4**	**273,180**	**466,600**
Durham	17,000	28.0	476,000	823,500	1,000	14.0	14,000	23,900
Haliburton	180	26.0	4,680	8,100	30	15.0	450	800
Hastings	8,200	28.0	229,600	397,200	1,100	14.0	15,160	25,900
Muskoka	80	26.0	2,100	3,600	100	20.0	2,000	3,400
Northumberland	17,100	27.0	461,700	798,700	1,000	18.0	18,000	30,800
Ontario	19,000	31.0	589,000	1,018,900	1,500	17.0	25,500	43,600
Parry Sound	90	29.0	2,610	4,500	300	19.0	5,700	9,700
Peterborough	18,200	24.0	436,800	755,700	500	16.0	8,000	13,700
Prince Edward	6,300	24.0	151,200	261,600	500	20.0	10,000	17,100
Victoria	16,200	28.0	453,600	784,800	270	19.0	5,130	8,800
York	42,900	32.0	1,372,800	2,374,900	1,600	17.0	27,200	46,500
Central Ontario	**145,250**	**28.8**	**4,180,090**	**7,231,500**	**7,900**	**16.6**	**131,140**	**224,200**
Carleton	1,220	33.0	40,260	69,600	1,800	18.5	33,280	57,900
Dundas	420	23.0	9,660	16,700	400	18.0	7,200	12,500
Frontenac	1,040	29.0	30,160	52,200	800	18.0	14,400	25,000
Glengarry	680	24.0	16,300	28,200	1,000	20.0	20,000	34,800
Grenville	440	21.0	9,240	16,000	400	16.0	6,400	11,100
Lanark	1,400	22.0	30,800	53,300	1,700	18.0	30,600	53,200
Leeds	390	26.0	10,140	17,500	500	20.0	10,000	17,400
Lennox & Addington	3,200	26.0	83,200	143,900	1,200	19.0	22,800	39,700
Prescott	340	29.0	9,860	17,100	400	20.0	8,000	13,900
Renfrew	1,850	34.0	62,900	108,800	4,300	17.0	73,100	127,200
Russell	320	26.0	8,300	14,400	500	19.0	9,500	16,500
Stormont	800	24.0	19,200	33,200	500	21.0	10,500	18,300
Eastern Ontario	**12,100**	**27.3**	**330,020**	**570,900**	**13,500**	**18.2**	**245,780**	**427,500**
Algoma	710	27.0	19,170	33,200	500	19.0	9,500	17,000
Cochrane	160	23.0	3,680	6,400	500	14.0	7,000	12,500
Kenora	30	23.0	690	1,200	400	14.0	5,600	10,000
Manitoulin	600	23.0	13,800	23,900	400	14.0	5,600	10,000
Nipissing	260	25.0	6,500	11,200	600	17.0	10,200	18,300
Rainy River	420	23.0	9,660	16,700	4,400	19.0	83,600	149,600
Sudbury	210	24.0	5,040	8,700	900	16.0	14,400	25,800
Thunder Bay	160	25.0	4,000	6,900	1,200	21.0	25,500	45,600
Timiskaming	200	28.0	5,600	9,700	1,200	17.0	20,400	36,500
Northern Ontario	**2,750**	**24.8**	**68,140**	**117,900**	**10,100**	**18.0**	**181,800**	**325,300**
The Province, 1949	**805,000**	**30.7**	**24,714,000**	**42,755,000**	**59,000**	**18.0**	**1,062,000**	**1,837,000**

OATS AND BARLEY

Showing by County Municipalities of Ontario the area, production and farm value of Oats and Barley for the year 1949.

Counties and Districts	Oats				Barley			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	29,200	33.0	963,600	731,400	2,100	30.0	63,000	70,600
Elgin	42,000	39.0	1,634,000	1,244,600	2,500	33.0	82,500	92,400
Essex	44,000	36.0	1,583,100	1,201,700	600	31.0	18,600	20,800
Haldimand	45,000	35.0	1,755,000	1,197,900	1,500	30.0	45,000	50,400
Kent	59,200	41.0	2,409,200	1,843,600	4,400	31.0	136,400	152,800
Lambton	92,500	40.0	3,740,000	2,885,900	5,200	37.0	192,400	215,500
Lincoln	22,300	28.0	624,400	474,600	700	18.0	12,600	14,100
Middlesex	86,800	41.0	3,508,800	2,701,300	8,400	36.0	302,400	338,700
Norfolk	35,000	39.0	1,345,000	1,038,000	1,200	34.0	40,800	45,700
Oxford	52,700	40.0	2,108,000	1,602,100	4,200	34.0	142,800	160,000
Welland	29,100	32.0	931,200	706,900	1,100	22.0	24,200	27,100
Wentworth	35,000	34.0	1,171,000	903,500	700	31.0	21,700	24,300
Southern Ontario	**572,800**	**38.0**	**21,775,800**	**16,531,500**	**32,600**	**33.2**	**1,082,400**	**1,212,400**
Bruce	72,300	39.0	2,821,500	2,178,000	15,700	35.0	549,500	648,000
Dufferin	28,400	35.0	995,000	764,300	4,400	30.0	132,000	155,800
Grey	95,000	40.0	3,802,000	2,930,100	16,200	32.0	522,700	616,800
Halton	27,100	24.0	651,400	500,600	2,800	21.0	58,800	69,400
Huron	57,000	42.0	2,396,000	1,843,600	22,000	36.0	792,000	936,600
Peel	28,200	25.0	706,000	542,500	2,400	23.0	55,200	65,100
Perth	61,400	39.0	2,396,600	1,845,100	15,200	34.0	520,800	614,500
Simcoe	83,800	30.0	2,516,000	1,937,700	10,000	25.0	250,000	295,000
Waterloo	37,100	34.0	1,262,400	970,200	3,700	29.0	107,300	126,600
Wellington	59,300	32.0	1,898,600	1,462,200	7,300	30.0	219,000	258,400
Western Ontario	**549,600**	**35.4**	**19,445,500**	**14,974,300**	**99,700**	**32.0**	**3,207,300**	**3,786,200**
Durham	35,300	24.0	847,200	660,600	2,600	21.0	54,600	63,300
Haliburton	8,500	28.0	238,000	187,000	50	24.0	1,200	1,400
Hastings	72,100	30.0	2,163,200	1,686,700	3,400	27.0	91,800	106,500
Muskoka	11,400	37.0	421,800	329,900	300	32.0	9,600	11,100
Northumberland	58,000	30.0	1,740,000	1,357,400	2,300	27.0	62,100	72,000
Ontario	39,600	33.0	1,306,800	1,019,900	8,100	28.0	226,800	263,100
Parry Sound	19,000	36.0	684,000	533,800	1,100	33.0	36,300	42,100
Peterborough	38,000	26.0	988,000	771,100	1,650	24.0	39,600	45,900
Prince Edward	24,900	35.0	871,500	679,500	1,400	26.0	36,400	42,200
Victoria	29,000	29.0	841,000	655,800	6,400	28.0	179,200	207,900
York	59,600	32.0	1,907,200	1,486,700	8,200	28.0	229,600	266,300
Central Ontario	**395,400**	**30.4**	**12,008,700**	**9,368,400**	**35,500**	**27.2**	**967,200**	**1,121,800**
Carleton	65,100	38.0	2,473,800	2,028,700	5,300	32.0	169,600	205,200
Dundas	18,600	29.0	539,400	441,400	3,200	23.0	73,600	89,100
Frontenac	28,900	31.0	895,900	732,500	1,400	28.0	39,200	47,400
Glengarry	39,600	32.0	1,267,200	1,042,700	3,700	27.0	99,900	120,900
Grenville	22,700	27.0	612,900	501,400	1,500	24.0	36,000	43,600
Lanark	35,000	32.0	1,120,000	916,500	2,800	27.0	75,600	91,500
Leeds	36,600	29.0	1,061,400	868,600	2,000	27.0	54,000	65,300
Lennox & Addington	40,000	29.0	1,160,000	949,800	2,200	23.0	50,600	61,200
Prescott	53,200	35.0	1,862,000	1,529,000	4,700	24.0	112,800	136,500
Renfrew	65,400	35.0	2,289,000	1,875,000	6,900	28.0	193,200	233,800
Russell	38,500	35.0	1,347,500	1,103,200	3,200	27.0	86,400	104,500
Stormont	28,400	36.0	1,022,400	834,800	1,700	31.0	52,700	63,800
Eastern Ontario	**472,000**	**33.2**	**15,651,500**	**12,823,600**	**38,600**	**27.0**	**1,043,600**	**1,262,800**
Algoma	11,900	34.0	404,600	316,600	1,500	30.0	45,000	51,800
Cochrane	12,800	31.0	396,800	310,500	1,600	30.0	48,000	55,200
Kenora	3,100	29.0	89,900	70,600	1,000	22.0	22,000	25,300
Manitoulin	7,400	26.0	192,400	151,100	900	24.0	21,600	24,800
Nipissing	15,400	29.0	446,600	349,300	1,000	28.0	28,000	32,200
Rainy River	7,700	35.0	269,500	232,300	7,000	29.0	203,000	233,500
Sudbury	13,400	33.0	442,200	345,900	5,100	27.0	137,700	158,400
Thunder Bay	6,000	45.0	270,000	211,600	700	34.0	23,800	27,400
Timiskaming	18,500	31.0	573,500	448,300	2,800	28.0	78,400	90,200
Northern Ontario	**96,200**	**32.1**	**3,085,500**	**2,436,200**	**21,600**	**28.1**	**607,500**	**698,800**
The Province, 1949	**2,086,000**	**34.5**	**71,967,000**	**56,134,000**	**228,000**	**30.3**	**6,908,000**	**8,082,000**

DRY PEAS AND DRY BEANS

Showing by County Municipalities of Ontario the area, production and farm value of Dry Peas and Dry Beans for the year 1949.

Counties and Districts	Dry Peas				Dry Beans			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	250	19.2	4,800	10,400	50	20.0	1,000	3,300
Elgin	...	...	...	...	9,900	24.0	237,600	784,100
Essex	600	22.2	13,300	28,700	50	19.0	950	3,100
Haldimand	...	...	...	...	...	...	...	...
Kent	600	21.3	12,800	27,600	28,000	17.0	476,300	1,578,100
Lambton	900	20.3	18,300	39,500	4,300	22.0	94,600	312,200
Lincoln	50	20.0	1,000	2,200	...	...	...	...
Middlesex	600	18.3	11,000	23,700	14,000	20.4	285,550	942,300
Norfolk	...	...	...	...	50	15.0	750	2,600
Oxford	200	19.5	3,900	8,400	100	19.0	1,900	6,300
Welland	...	...	...	...	50	19.0	950	3,100
Wentworth	100	19.0	1,900	4,100	...	...	...	...
Southern Ontario	**3,300**	**20.3**	**67,000**	**144,600**	**56,500**	**19.5**	**1,099,600**	**3,635,100**
Bruce	2,500	13.5	33,800	77,600	...	...	...	...
Dufferin	1,200	12.6	15,100	34,700	...	...	...	...
Grey	300	14.7	4,400	10,100	50	19.1	950	3,200
Halton	300	11.7	3,500	8,000	...	...	...	...
Huron	1,100	17.4	19,100	43,800	22,500	20.0	449,380	1,505,400
Peel	...	...	...	...	...	...	...	...
Perth	900	16.4	14,800	34,000	450	17.0	7,650	25,600
Simcoe	1,400	17.4	24,400	56,000	30	15.3	460	1,500
Waterloo	600	20.3	12,200	28,000	30	15.8	470	1,600
Wellington	1,000	12.6	12,600	28,900	40	16.0	640	2,100
Western Ontario	**9,300**	**15.0**	**139,900**	**321,100**	**23,100**	**19.9**	**459,550**	**1,539,400**
Durham	600	11.7	7,000	17,600	50	14.5	730	2,480
Haliburton	...	...	...	...	...	...	...	...
Hastings	600	17.5	10,500	26,400	20	15.0	300	1,020
Muskoka	50	15.0	750	1,900	...	...	...	...
Northumberland	300	15.3	4,600	11,500	400	14.7	5,850	19,880
Ontario	300	17.3	5,200	13,100	50	15.5	780	2,650
Parry Sound	1,100	18.4	20,200	50,700	20	14.0	280	950
Peterborough	300	17.3	5,200	13,100	30	15.0	450	1,530
Prince Edward	50	17.0	850	2,100	30	14.5	440	1,500
Victoria	600	10.7	6,400	16,100	100	12.5	1,250	4,250
York	200	15.5	3,100	7,800	100	14.0	1,400	4,760
Central Ontario	**4,100**	**15.6**	**63,800**	**160,300**	**800**	**14.4**	**11,480**	**39,020**
Carleton	600	14.5	8,700	25,000	50	14.5	730	2,520
Dundas	30	14.7	440	1,300	30	14.8	440	1,520
Frontenac	20	14.0	280	800	20	14.0	280	970
Glengarry	50	13.6	680	2,000	20	15.3	300	1,040
Grenville	100	13.5	1,350	3,900	10	14.0	140	480
Lanark	1,000	13.5	13,500	38,800	50	15.1	760	2,620
Leeds	20	14.0	280	800	10	14.8	150	520
Lennox & Addington	600	13.5	8,100	23,300	50	14.9	750	2,590
Prescott	500	14.6	7,300	21,000	30	15.0	450	1,550
Renfrew	4,100	13.5	55,430	159,800	50	15.1	760	2,620
Russell	400	15.5	6,200	17,800	100	14.2	1,420	4,900
Stormont	180	16.4	2,960	8,500	30	15.0	450	1,550
Eastern Ontario	**7,600**	**13.8**	**105,220**	**303,000**	**450**	**15.4**	**6,630**	**22,880**
Algoma	200	11.6	2,320	5,700	...	...	...	...
Cochrane	100	13.5	1,350	3,300	20	15.0	300	1,050
Kenora	...	...	...	...	...	...	...	...
Manitoulin	200	15.5	3,100	7,600	...	...	...	...
Nipissing	100	13.5	1,350	3,300	10	12.9	130	460
Rainy River	...	...	...	...	...	...	...	...
Sudbury	175	10.7	1,870	4,600	20	15.5	310	1,090
Thunder Bay	25	18.0	450	1,100	...	...	...	...
Timiskaming	300	15.5	4,640	11,400	...	...	...	...
Northern Ontario	**1,100**	**13.7**	**15,080**	**37,000**	**50**	**14.8**	**740**	**2,600**
The Province, 1949	**25,400**	**15.4**	**391,000**	**966,000**	**80,900**	**19.5**	**1,578,000**	**5,239,000**

RYE AND BUCKWHEAT

Showing by County Municipalities of Ontario the area, production and farm value of Rye and Buckwheat for the year 1949.

Counties and Districts	Rye				Buckwheat			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	6,000	21.0	126,000	160,500	1,800	18.0	32,400	34,900
Elgin	8,100	23.0	186,300	237,300	3,600	23.0	83,090	89,300
Essex	4,900	25.0	122,500	156,100	100	21.0	2,100	2,300
Haldimand	1,100	22.0	24,200	30,800	1,000	23.0	23,000	24,700
Kent	8,000	24.0	192,300	244,600	100	23.0	2,300	2,500
Lambton	1,300	22.0	28,600	36,400	800	21.0	16,800	18,100
Lincoln	350	19.0	6,650	8,500	100	17.0	1,700	1,800
Middlesex	2,800	21.0	58,800	74,900	1,600	24.0	38,400	41,300
Norfolk	22,700	23.2	525,800	670,400	1,200	22.0	26,400	28,400
Oxford	3,400	19.0	64,600	82,300	1,300	23.0	29,900	32,200
Welland	850	19.0	16,150	20,600	1,000	22.0	22,000	23,700
Wentworth	800	22.0	17,600	22,400	700	20.0	14,000	15,100
Southern Ontario	**60,300**	**22.7**	**1,369,500**	**1,744,800**	**13,300**	**21.9**	**292,090**	**314,300**
Bruce	700	20.0	14,000	19,500	700	17.0	11,900	13,600
Dufferin	1,100	19.0	20,900	29,000	900	20.0	18,000	20,600
Grey	2,800	20.0	56,000	77,800	2,200	21.0	46,200	52,800
Halton	400	17.0	6,800	9,500	200	13.0	2,600	3,000
Huron	2,100	20.0	42,000	58,400	2,800	31.0	86,800	99,100
Peel	1,400	19.0	26,600	37,000	200	19.0	3,800	4,300
Perth	1,500	20.0	30,000	41,700	1,600	24.0	38,400	43,900
Simcoe	7,800	19.0	148,200	205,900	5,200	18.4	95,600	109,100
Waterloo	700	19.0	13,300	18,500	100	19.0	19,000	21,700
Wellington	2,000	20.0	40,000	55,600	1,700	26.0	44,200	50,500
Western Ontario	**20,500**	**19.4**	**397,800**	**552,900**	**15,600**	**23.5**	**366,500**	**418,600**
Durham	3,700	19.0	70,300	99,100	2,600	16.0	41,600	49,100
Haliburton	100	19.0	1,900	2,700	200	17.0	3,400	4,000
Hastings	1,600	17.0	27,200	38,300	900	19.0	17,100	20,200
Muskoka	100	17.0	1,700	2,400	200	23.0	4,600	5,400
Northumberland	5,100	18.0	91,800	129,400	3,400	20.0	68,000	80,300
Ontario	2,400	18.0	43,200	60,900	1,300	20.0	26,000	30,700
Parry Sound	100	20.0	2,000	2,800	100	28.0	2,800	3,300
Peterborough	600	19.0	11,400	16,100	600	18.0	10,800	12,700
Prince Edward	3,400	18.0	61,200	86,300	1,200	20.0	24,000	28,300
Victoria	500	18.0	9,000	12,700	1,100	18.0	19,800	23,400
York	1,600	19.0	30,400	42,900	1,100	24.0	26,400	31,200
Central Ontario	**19,200**	**18.2**	**350,100**	**493,600**	**12,700**	**19.3**	**244,500**	**288,600**
Carleton	300	23.0	6,900	11,100	2,000	21.0	42,000	51,500
Dundas	300	18.0	5,400	8,700	1,600	18.0	28,800	35,300
Frontenac	100	18.0	1,800	2,900	300	18.0	5,400	6,600
Glengarry	100	19.0	1,900	3,000	2,600	18.0	46,800	57,400
Grenville	100	19.0	1,900	3,000	5,600	21.0	117,600	144,400
Lanark	200	18.0	3,600	5,800	5,000	19.0	95,000	116,700
Leeds	400	18.0	7,200	11,500	2,000	18.0	36,000	44,200
Lennox & Addington	1,000	17.0	17,000	27,200	1,600	20.0	32,000	39,300
Prescott	200	18.0	3,600	5,800	1,300	19.0	24,700	30,300
Renfrew	2,100	18.0	37,800	60,600	4,200	20.0	84,000	103,100
Russell	100	17.0	1,700	2,700	1,500	20.0	30,000	36,800
Stormont	200	17.0	3,400	5,400	1,500	25.0	37,500	46,000
Eastern Ontario	**5,100**	**18.1**	**92,200**	**147,700**	**29,200**	**10.9**	**579,800**	**711,600**
Algoma	100	20.0	2,000	2,600	100	21.0	2,100	2,600
Cochrane	40	17.0	680	850	30	15.0	450	560
Kenora	10	16.0	160	200	20	18.0	360	440
Manitoulin	100	18.0	1,800	2,300	100	16.0	1,600	2,000
Nipissing	100	19.0	1,900	2,400	300	22.0	6,600	8,300
Rainy River	200	19.0	3,800	4,900	150	14.0	2,100	2,600
Sudbury	300	17.0	5,100	6,500	500	19.0	9,500	12,100
Thunder Bay	30	20.0	600	800	100	19.0	1,900	2,400
Timiskaming	20	18.0	360	450	100	15.0	1,500	1,900
Northern Ontario	**900**	**18.2**	**16,400**	**21,000**	**1,400**	**18.7**	**26,110**	**32,900**
The Province, 1949	**106,000**	**21.0**	**2,226,000**	**2,960,000**	**72,200**	**20.9**	**1,509,000**	**1,766,000**

FLAX AND MIXED GRAINS

Showing by County Municipalities of Ontario the area, production and farm value of Flax and Mixed Grains for the year 1949.

Counties and Districts	Flax				Mixed Grains			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	140	11.0	1,540	5,080	12,700	33.0	419,100	365,600
Elgin	10	11.0	110	360	13,000	38.0	494,000	430,800
Essex	30	11.0	330	1,090	2,200	34.0	74,800	65,100
Haldimand	......	....	......	......	8,500	33.0	280,500	245,000
Kent	80	13.0	1,040	3,430	7,300	38.0	277,400	242,000
Lambton	300	12.0	3,600	11,880	10,700	41.0	438,700	382,700
Lincoln	......	....	......	......	2,200	27.0	59,400	51,700
Middlesex	800	12.7	10,160	33,530	39,000	42.0	1,638,000	1,429,100
Norfolk	30	12.0	360	1,190	5,200	40.0	208,000	182,000
Oxford	250	12.0	3,000	9,900	57,400	42.0	2,410,800	2,101,400
Welland	60	10.0	600	1,980	2,400	31.0	74,400	64,700
Wentworth	......	....	......	......	16,600	32.0	531,200	463,100
Southern Ontario	**1,700**	**12.2**	**20,740**	**68,440**	**177,200**	**39.0**	**6,906,300**	**6,023,200**
Bruce	1,300	14.0	18,200	60,060	67,200	41.7	2,802,400	2,565,300
Dufferin	500	12.0	6,000	19,800	41,000	36.8	1,507,000	1,379,500
Grey	1,400	14.0	19,600	64,680	85,500	39.8	3,400,000	3,112,400
Halton	50	11.0	550	1,820	18,900	24.0	453,600	415,200
Huron	1,700	13.9	23,620	77,950	91,400	41.7	3,808,800	3,486,600
Peel	200	11.0	2,200	7,260	34,600	27.0	934,200	855,200
Perth	500	14.0	7,000	23,100	103,300	40.7	4,205,300	3,849,400
Simcoe	30	12.0	360	1,190	64,100	30.5	1,957,100	1,791,500
Waterloo	20	12.0	240	790	53,200	33.6	1,788,800	1,637,500
Wellington	1,500	12.0	18,000	59,400	101,700	34.6	3,520,500	3,222,700
Western Ontario	**7,200**	**13.3**	**95,770**	**316,050**	**660,900**	**36.9**	**24,377,700**	**22,315,300**
Durham	50	9.0	450	1,490	41,000	25.0	1,025,000	965,500
Haliburton	......	....	......	......	700	27.0	18,900	17,800
Hastings	30	9.0	260	860	13,900	34.0	472,600	445,200
Muskoka	......	....	......	......	700	37.0	25,900	24,300
Northumberland	......	....	......	......	25,000	30.0	750,000	706,000
Ontario	100	10.0	1,000	3,300	54,200	35.0	1,897,000	1,785,200
Parry Sound	......	....	......	......	2,200	38.0	83,600	78,600
Peterborough	200	10.0	2,000	6,600	6,400	29.0	185,600	174,500
Prince Edward	10	9.0	90	300	6,000	34.0	204,000	191,800
Victoria	......	....	......	......	33,800	32.0	1,081,300	1,017,700
York	110	11.0	1,200	3,960	51,100	32.0	1,635,200	1,537,100
Central Ontario	**500**	**10.0**	**5,000**	**16,510**	**235,000**	**31.4**	**7,379,100**	**6,943,700**
Carleton	100	12.0	1,200	3,960	15,500	40.0	620,000	607,600
Dundas	50	10.0	500	1,650	22,000	26.0	572,000	560,600
Frontenac	50	11.0	550	1,820	3,400	32.0	134,400	131,700
Glengarry	30	11.0	330	1,090	4,800	28.0	134,400	131,700
Grenville	40	8.0	240	790	7,600	26.0	197,600	193,600
Lanark	......	....	......	......	17,100	33.0	108,800	106,600
Leeds	30	10.0	300	990	7,800	34.0	265,200	259,900
Lennox & Addington	30	10.0	300	990	12,200	34.0	414,800	406,500
Prescott	700	11.0	7,700	25,410	4,800	32.0	153,600	150,500
Renfrew	50	11.0	550	1,820	8,700	35.0	304,500	298,400
Russell	1,200	11.4	13,640	45,010	6,300	38.0	239,400	234,600
Stormont	20	11.0	220	730	6,400	36.0	230,400	225,800
Eastern Ontario	**2,300**	**11.1**	**25,530**	**84,260**	**116,600**	**28.9**	**3,375,100**	**3,307,500**
Algoma	10	10.0	100	330	3,400	34.0	115,600	120,200
Cochrane	20	10.0	200	660	1,400	30.0	42,000	43,700
Kenora	300	9.0	2,700	8,910	800	26.0	20,800	21,600
Manitoulin	100	10.0	1,000	3,300	3,000	28.0	84,000	87,400
Nipissing	40	10.0	400	1,320	1,400	35.0	49,000	51,000
Rainy River	4,260	10.3	43,860	144,910	1,000	36.0	36,000	37,400
Sudbury	10	10.0	100	330	2,500	30.0	75,000	78,000
Thunder Bay	20	10.0	200	660	2,000	48.0	96,000	99,900
Timiskaming	40	10.0	400	1,320	5,800	33.0	191,400	199,100
Northern Ontario	**4,800**	**10.2**	**48,960**	**161,740**	**21,300**	**33.3**	**709,800**	**738,300**
The Province, 1949	**16,500**	**11.9**	**196,000**	**647,000**	**1,211,000**	**35.3**	**42,748,000**	**39,328,000**

CORN

Showing by County Municipalities of Ontario the area, production and farm value of Corn for husking and for fodder for the year 1949.

Counties and Districts	Corn for Husking				Corn for Fodder			
	Acres	Per acre	Bushels (shelled)	Farm value	Acres	Per acre	Tons (green)	Farm value
				$				$
Brant	2,500	42.0	105,000	129,200	7,400	9.4	69,600	389,200
Elgin	18,200	55.0	1,001,000	1,231,200	23,500	9.6	225,300	1,260,300
Essex	74,200	53.0	3,933,460	4,848,000	11,800	9.5	111,900	626,200
Haldimand	1,600	60.0	96,000	118,100	4,300	8.8	37,800	211,700
Kent	74,100	50.0	3,702,000	4,560,200	26,200	10.1	264,400	1,479,100
Lambton	21,800	56.0	1,220,800	1,503,600	30,400	10.4	316,100	1,768,600
Lincoln	800	55.0	44,000	54,100	4,600	8.5	39,100	218,800
Middlesex	14,400	50.0	720,000	885,600	30,700	10.4	320,100	1,791,000
Norfolk	5,400	65.0	351,000	431,700	9,600	12.1	116,200	650,100
Oxford	5,900	62.0	365,800	449,900	23,000	12.1	278,0000	1,555,400
Welland	1,300	40.0	52,000	64,000	6,800	7.2	49,000	273,900
Wentworth	1,800	58.0	104,400	128,400	5,600	11.0	61,600	344,700
Southern Ontario	**222,000**	**52.7**	**11,695,460**	**14,404,000**	**183,900**	**10.3**	**1,889,100**	**10,569,000**
Bruce	700	51.0	35,700	45,700	5,500	10.0	55,000	319,000
Dufferin	200	45.0	9,000	11,500	1,600	9.1	14,600	84,400
Grey	200	50.0	10,000	12,800	9,300	8.8	81,800	474,700
Halton	600	48.0	28,800	36,900	5,000	8.5	42,500	246,500
Huron	3,800	58.0	220,000	282,100	11,900	12.1	144,000	835,200
Peel	100	49.0	4,900	6,300	4,100	8.4	34,400	199,800
Perth	3,600	54.0	194,300	248,300	13,100	9.8	128,400	744,600
Simcoe	1,000	49.0	49,000	62,700	11,600	8.6	99,800	578,600
Waterloo	3,400	54.0	183,600	235,000	10,400	10.3	107,100	621,300
Wellington	1,400	51.0	71,400	91,400	11,300	10.8	122,000	707,800
Western Ontario	**15,000**	**53.8**	**806,700**	**1,032,700**	**83,800**	**9.9**	**829,600**	**4,811,900**
Durham	600	47.0	28,200	38,100	11,200	8.2	91,800	551,000
Haliburton	30	39.0	1,170	1,600	400	7.5	3,000	18,000
Hastings	1,000	50.0	50,000	67,500	7,300	7.4	54,000	324,100
Muskoka	20	42.0	840	1,100	500	8.3	4,200	24,900
Northumberland	1,200	38.0	45,600	61,600	9,600	8.6	82,500	495,400
Ontario	2,800	48.0	134,400	181,400	12,900	8.3	107,100	642,900
Parry Sound	50	42.0	2,100	2,800	600	9.0	5,400	32,400
Peterborough	200	50.0	10,000	13,500	5,000	9.8	49,000	294,000
Prince Edward	700	51.0	35,700	48,200	3,800	8.9	33,800	202,900
Victoria	600	46.0	27,600	37,300	3,900	9.2	35,900	215,300
York	1,000	54.0	54,000	72,900	11,200	9.0	100,800	604,800
Central Ontario	**8,200**	**47.5**	**389,610**	**526,000**	**66,400**	**8.5**	**567,500**	**3,405,700**
Carleton	600	42.0	25,200	34,000	12,900	12.2	157,300	960,000
Dundas	900	45.0	40,500	54,600	13,600	13.0	176,600	1,076,600
Frontenac	200	51.0	10,200	13,800	3,600	8.2	29,500	180,100
Glengarry	300	45.0	13,500	18,200	5,300	11.5	61,000	371,800
Grenville	300	50.0	15,000	20,300	5,500	12.5	68,800	418,400
Lanark	400	40.0	16,000	21,600	7,000	9.6	67,200	408,900
Leeds	300	40.0	12,000	16,200	12,900	8.4	108,000	661,000
Lennox & Addington	500	43.0	21,500	29,000	2,600	7.8	20,300	123,700
Prescott	300	38.0	11,400	15,400	5,000	9.9	50,000	301,900
Renfrew	300	42.0	12,600	17,000	2,200	10.0	22,000	134,200
Russell	400	42.0	16,800	22,700	6,300	10.5	66,200	403,500
Stormont	200	47.0	9,400	12,700	5,800	9.8	56,800	346,700
Eastern Ontario	**4,700**	**43.4**	**204,100**	**275,500**	**82,700**	**10.6**	**883,700**	**5,386,800**
Algoma	30	44.0	1,320	1,900	100	8.9	890	6,200
Cochrane	....	....	....	....	20	9.9	200	1,400
Kenora	....	....	....	....	....	....	....	....
Manitoulin	....	....	....	....	500	8.5	4,260	29,700
Nipissing	30	39.0	1,170	1,700	300	8.0	2,400	16,800
Rainy River	20	41.0	820	1,100	100	8.4	840	5,900
Sudbury	20	41.0	820	1,100	40	8.8	350	2,500
Thunder Bay	....	....	....	....	120	8.5	1,020	7,100
Timiskaming	....	....	....	....	20	6.8	140	1,000
Northern Ontario	**100**	**41.3**	**4,130**	**5,800**	**1,200**	**8.4**	**10,100**	**70,600**
The Province, 1949	**250,000**	**52.4**	**13,100,000**	**16,244,000**	**418,000**	**10.0**	**4,180,000**	**24,244,000**

POTATOES AND FIELD ROOTS

Showing by County Municipalities of Ontario the area, production and farm value of Potatoes and Field Roots for the year 1949.

Counties and Districts	Potatoes				Field Roots			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
Brant	1,500	130	195,000	236,300	1,000	400	400,000	220,000
Elgin	1,700	151	255,000	309,100	100	300	30,000	16,500
Essex	11,800	199	2,347,600	2,845,400	150	300	45,000	24,800
Haldimand	400	109	43,600	52,800	100	300	30,000	16,500
Kent	2,700	204	550,800	667,600	300	400	120,000	66,000
Lambton	1,400	230	322,000	390,300	500	300	150,000	82,500
Lincoln	300	127	38,100	46,200	150	270	40,500	22,300
Middlesex	2,900	243	704,700	854,100	1,400	400	560,000	308,000
Norfolk	2,000	174	348,000	421,800	100	300	30,000	16,500
Oxford	1,100	137	150,700	182,600	4,500	400	1,800,000	990,000
Welland	500	143	71,500	86,700	100	300	30,000	16,500
Wentworth	4,300	218	937,400	1,136,100	1,200	400	480,000	264,000
Southern Ontario	**30,600**	**194**	**5,964,400**	**7,229,000**	**9,600**	**387**	**3,715,500**	**2,043,600**
Bruce	1,600	115	184,000	182,200	2,400	262	628,800	345,800
Dufferin	3,300	183	603,800	597,800	700	232	162,400	89,300
Grey	4,100	129	528,900	523,600	2,000	302	604,000	332,200
Halton	800	116	92,800	91,900	1,000	272	272,000	149,600
Huron	1,600	156	249,600	247,100	4,700	355	1,668,100	917,400
Peel	1,300	143	185,900	184,000	300	202	60,600	33,300
Perth	1,500	128	192,000	190,100	3,000	272	816,000	448,800
Simcoe	10,800	151	1,630,800	1,614,500	2,300	172	395,600	217,600
Waterloo	2,300	151	347,300	343,800	3,500	352	1,232,000	677,600
Wellington	3,500	161	563,500	557,900	5,000	302	1,510,000	830,500
Western Ontario	**30,800**	**149**	**4,578,600**	**4,532,900**	**24,900**	**295**	**7,349,500**	**4,042,100**
Durham	2,700	157	423,900	491,700	1,000	150	150,000	82,500
Haliburton	400	105	42,000	48,700	50	230	11,500	6,300
Hastings	3,100	126	390,600	453,100	400	240	96,000	52,800
Muskoka	600	151	90,600	105,100	200	260	52,000	28,600
Northumberland	3,000	135	405,000	469,800	1,000	280	280,000	154,000
Ontario	3,800	158	600,400	696,500	3,000	280	840,000	462,000
Parry Sound	900	213	191,700	222,400	300	280	84,000	46,200
Peterborough	1,700	97	164,900	191,300	550	210	115,500	63,500
Prince Edward	800	130	104,000	120,600	100	300	30,000	16,500
Victoria	1,100	151	166,100	192,700	800	240	192,000	105,600
York	3,600	173	622,800	722,400	3,000	280	840,000	462,000
Central Ontario	**21,700**	**148**	**3,202,000**	**3,714,300**	**10,400**	**258**	**2,691,000**	**1,480,000**
Carleton	2,500	150	375,000	401,300	600	350	210,000	115,500
Dundas	800	128	102,400	109,600	50	300	15,000	8,300
Frontenac	2,100	139	291,900	312,300	100	250	25,000	13,800
Glengarry	1,000	112	112,000	119,800	100	200	20,000	11,000
Grenville	1,500	142	213,000	227,900	100	220	22,000	12,100
Lanark	1,700	97	164,900	176,400	200	200	40,000	22,000
Leeds	1,700	97	164,900	176,400	300	240	72,000	39,600
Lennox & Addington	1,900	143	271,700	290,700	200	250	50,000	27,500
Prescott	1,900	156	296,400	317,100	100	250	25,000	13,800
Renfrew	4,000	149	596,000	637,700	300	230	69,000	38,000
Russell	1,400	146	204,400	218,700	100	250	25,000	13,700
Stormont	900	110	99,000	105,900	50	270	13,500	7,400
Eastern Ontario	**21,400**	**135**	**2,891,600**	**3,093,800**	**2,200**	**267**	**586,500**	**322,700**
Algoma	800	172	137,600	183,000	200	290	58,000	31,900
Cochrane	1,500	184	276,000	367,100	200	300	60,000	33,000
Kenora	300	128	38,400	51,100	50	330	16,500	9,100
Manitoulin	500	138	69,000	91,800	50	300	15,000	83,000
Nipissing	1,800	137	246,600	328,000	200	300	60,000	33,000
Rainy River	800	128	102,400	136,200	150	220	33,000	18,200
Sudbury	3,400	186	632,400	841,100	250	260	65,000	35,800
Thunder Bay	2,200	173	380,600	506,200	400	320	128,000	70,400
Timiskaming	1,200	167	200,400	266,500	200	290	58,000	31,900
Northern Ontario	**12,500**	**167**	**2,083,400**	**2,771,000**	**1,700**	**290**	**493,500**	**271,600**
The Province, 1949	**117,000**	**160**	**18,720,000**	**21,341,000**	**48,800**	**304**	**14,836,000**	**8,160,000**

ALFALFA AND HAY AND CLOVER

Showing by County Municipalities of Ontario the area, production and farm value of Alfalfa, Hay and Clover for the year 1949.

Counties and Districts	Alfalfa				Hay and Clover			
	Acres	Per acre	Tons	Farm value	Acres	Per acre	Tons	Farm value
				$				$
Brant	7,300	1.70	12,500	252,600	26,300	1.10	28,900	524,500
Elgin	12,800	2.10	27,000	545,700	44,600	1.50	66,900	1,214,200
Essex	16,400	2.20	36,200	731,600	22,100	1.80	39,800	722,400
Haldimand	28,000	2.20	61,700	1,247,200	37,800	1.30	49,100	891,200
Kent	22,600	2.70	61,200	1,236,900	23,500	1.70	39,900	724,200
Lambton	34,200	2.30	78,800	1,593,900	56,700	1.50	85,100	1,544,600
Lincoln	16,800	1.60	27,000	545,700	25,300	1.10	27,800	504,600
Middlesex	33,600	1.80	60,600	1,224,700	78,200	1.50	117,300	2,127,800
Norfolk	9,600	2.10	20,300	410,300	29,500	1.50	44,300	804,000
Oxford	13,500	1.80	24,700	499,200	70,200	1.50	105,300	1,911,200
Welland	11,200	1.20	13,500	272,800	39,600	0.90	35,700	648,000
Wentworth	8,300	2.00	16,700	337,500	37,300	1.30	48,500	880,300
Southern Ontario	**214,300**	**2.05**	**440,200**	**8,898,100**	**491,100**	**1.40**	**688,600**	**12,497,000**
Bruce	32,000	1.80	57,700	1,226,700	105,300	1.10	115,800	2,248,800
Dufferin	10,800	1.50	16,200	344,400	59,900	0.90	53,900	1,046,800
Grey	54,600	1.70	92,900	1,975,100	139,700	1.40	196,200	3,810,200
Halton	14,100	2.50	35,300	750,500	35,800	0.80	28,600	555,400
Huron	23,300	2.20	51,400	1,092,800	100,700	1.30	130,900	2,542,900
Peel	19,600	1.10	21,600	459,200	42,900	0.70	30,000	582,600
Perth	11,700	1.60	18,700	397,600	93,300	1.20	112,000	2,175,200
Simcoe	36,900	1.60	59,100	1,256,600	104,500	1.00	104,500	2,029,400
Waterloo	8,200	1.60	13,100	278,500	51,600	1.20	61,900	1,202,100
Wellington	18,700	1.40	26,200	557,000	114,700	1.00	114,700	2,227,500
Western Ontario	**229,900**	**1.70**	**392,200**	**8,338,400**	**848,400**	**1.12**	**948,500**	**18,420,900**
Durham	14,400	1.50	21,700	582,200	51,300	0.90	46,200	1,092,400
Haliburton	1,800	1.00	1,800	48,300	15,000	0.80	12,100	283,900
Hastings	26,300	1.50	39,600	1,062,900	85,800	1.20	103,000	2,437,300
Muskoka	400	1.40	560	15,000	29,000	1.20	34,800	823,400
Northumberland	18,900	1.50	28,500	764,700	58,800	1.20	70,600	1,669,400
Ontario	16,100	1.40	22,600	606,700	64,100	1.10	70,500	1,668,300
Parry Sound	400	1.70	680	18,200	43,800	1.50	65,700	1,554,500
Peterborough	14,100	1.30	18,400	493,700	50,000	1.10	55,000	1,301,300
Prince Edward	14,000	1.70	23,900	641,200	33,400	1.30	43,400	1,027,300
Victoria	17,900	1.30	23,300	625,100	59,200	1.20	71,000	1,680,800
York	34,100	1.40	47,960	1,286,800	65,100	0.80	52,100	1,232,200
Central Ontario	**158,400**	**1.44**	**229,000**	**6,144,800**	**555,500**	**1.12**	**624,400**	**14,770,800**
Carleton	23,700	2.00	47,400	1,036,300	96,200	1.31	126,000	2,386,400
Dundas	8,300	1.40	11,600	253,600	52,400	1.20	63,000	1,193,200
Frontenac	15,600	1.70	26,500	579,300	81,900	1.51	123,900	2,346,700
Glengarry	8,400	1.40	11,800	257,900	59,200	1.01	59,900	1,134,500
Grenville	6,900	1.60	11,000	240,500	52,800	1.13	59,500	1,126,900
Lanark	26,100	1.70	44,200	966,200	69,000	1.71	118,300	2,240,600
Leeds	19,300	1.80	34,700	758,500	73,000	1.31	95,700	1,812,600
Lennox & Addington	21,300	1.40	29,700	649,200	68,100	1.21	82,500	1,562,600
Prescott	5,100	2.40	12,200	266,700	69,300	1.71	118,800	2,252,900
Renfrew	31,000	2.30	71,000	1,552,200	90,100	1.30	117,100	2,218,900
Russell	6,300	1.70	10,700	233,900	48,600	1.20	58,300	1,104,200
Stormont	6,200	2.10	13,000	284,200	49,000	1.30	63,700	1,206,500
Eastern Ontario	**178,200**	**1.82**	**323,800**	**7,078,500**	**809,600**	**1.34**	**1,086,700**	**20,586,000**
Algoma	1,100	1.90	2,100	46,900	31,800	1.20	38,200	675,400
Cochrane	800	1.90	1,500	33,500	19,900	1.00	20,000	352,200
Kenora	400	1.80	720	16,100	7,000	1.10	7,700	136,300
Manitoulin	5,100	1.60	8,200	183,200	24,800	1.50	37,200	658,400
Nipissing	1,600	1.90	3,080	68,800	33,700	1.40	47,200	835,200
Rainy River	8,000	2.50	20,000	446,800	23,000	1.50	34,500	610,700
Sudbury	600	1.00	600	13,400	36,600	1.50	54,900	971,700
Thunder Bay	2,200	1.70	3,700	82,700	33,000	1.40	46,200	817,700
Timiskaming	1,400	2.10	2,900	64,800	36,600	1.50	54,900	971,700
Northern Ontario	**21,200**	**2.02**	**42,800**	**956,200**	**246,400**	**1.38**	**340,800**	**6,029,300**
The Province, 1949	**802,000**	**1.78**	**1,428,000**	**31,416,000**	**2,951,000**	**1.25**	**3,689,000**	**72,304,000**

PASTURE AND SOY BEANS

Showing by County Municipalities of Ontario the area in Seeded Pasture and Soy Beans in 1949

Counties and Districts	Seeded Pasture Acres	Soy Beans Acres	Per Acre	Bushels	Farm Value
					$
Brant	35,600	100	19.0	1,900	4,300
Elgin	69,200	6,800	20.5	139,400	315,000
Essex	29,700	39,000	27.0	1,052,000	2,375,910
Haldimand	38,200	100	23.0	2,300	5,200
Kent	53,000	34,600	25.6	885,290	2,000,000
Lambton	136,800	13,200	23.4	308,880	698,100
Lincoln	20,000	50	18.6	930	2,100
Middlesex	172,000	6,000	22.8	136,800	309,200
Norfolk	27,000	200	23.0	4,600	10,400
Oxford	89,100	300	20.9	6,270	14,200
Welland	29,800	300	17.3	5,190	11,700
Wentworth	30,000	50	17.9	900	2,000
Southern Ontario	**730,400**	**100,700**	**25.3**	**2,544,460**	**5,748,110**
Bruce	145,000	50	18.1	900	2,070
Dufferin	65,100	......	......	......	......
Grey	131,300	......	......	......	......
Halton	38,200	......	......	......	......
Huron	188,000	2,300	20.2	46,460	106,800
Peel	67,500	20	17.7	350	800
Perth	101,600	80	18.8	1,500	3,450
Simcoe	98,500	40	17.8	700	1,600
Waterloo	34,800	100	16.9	1,690	3,890
Wellington	97,300	10	16.0	160	370
Western Ontario	**967,300**	**2,600**	**19.9**	**51,760**	**118,980**
Durham	54,800	50	17.9	890	2,000
Haliburton	7,400	......	......	......	......
Hastings	56,200	......	......	......	......
Muskoka	16,500	......	......	......	......
Northumberland	58,900	50	17.3	860	1,940
Ontario	76,700	50	17.9	890	2,000
Parry Sound	12,600	......	......	......	......
Peterborough	49,300	......	......	......	......
Prince Edward	43,400	30	17.0	510	1,150
Victoria	36,200	30	16.0	480	1,090
York	56,500	190	18.2	3,460	7,820
Central Ontario	**468,500**	**400**	**17.7**	**7,090**	**16,000**
Carleton	74,900	10	16.0	160	370
Dundas	40,000	......	......	......	......
Frontenac	48,300	......	......	......	......
Glengarry	33,200	10	15.9	160	370
Grenville	30,100	......	......	......	......
Lanark	45,800	......	......	......	......
Leeds	39,900	......	......	......	......
Lennox and Addington	48,400	10	16.0	160	370
Prescott	36,400	10	20.0	200	460
Renfrew	66,500	20	18.3	370	850
Russell	28,400	10	19.0	190	440
Stormont	23,700	10	16.0	160	370
Eastern Ontario	**515,600**	**80**	**17.5**	**1,400**	**3,230**
Algoma	10,800	......	......	......	......
Cochrane	6,700	......	......	......	......
Kenora	1,600	......	......	......	......
Manitoulin	7,900	......	......	......	......
Nipissing	7,500	20	14.6	290	680
Rainy River	10,100	......	......	......	......
Sudbury	10,300	......	......	......	......
Thunder Bay	6,200	......	......	......	......
Timiskaming	13,500	......	......	......	......
Northern Ontario	**74,600**	**20**	**14.6**	**290**	**680**
The Province, 1949	**2,756,400**	**103,800**	**25.1**	**2,605,000**	**5,887,000**

Counties and Districts	ALL FIELD CROPS*			HONEY Estimated Number of Colonies, Yield per Colony and total production of honey in 1949		
	Acres	Value per Acre	Total Farm Value	Estimated Number of Colonies	Estimated Yield per Colony	Estimated Total Production
		$ c	$		lbs.	lbs.
Brant	116,860	35.16	4,108,480	2,900	41	118,000
Elgin	230,310	44.50	10,248,160	6,200	42	263,000
Essex	272,230	59.29	16,139,900	3,000	28	84,000
Haldimand	156,880	35.00	5,491,100	9,000	61	546,000
Kent	360,380	51.88	18,695,130	5,200	38	200,000
Lambton	345,500	45.63	15,764,880	13,300	63	832,000
Lincoln	86,220	29.81	2,570,100	3,500	10	36,000
Middlesex	373,880	43.34	16,203,230	5,200	38	196,000
Norfolk	140,380	40.15	5,636,690	800	68	54,000
Oxford	258,250	41.61	10,744,500	5,500	45	249,000
Welland	108,760	26.80	2,914,980	3,500	26	90,000
Wentworth	128,150	41.66	5,338,300	3,800	47	179,000
Southern Ontario	**2,577,800**	**44.17**	**113,855,450**	**61,900**	**46**	**2,847,000**
Bruce	334,650	33.66	11,265,630	14,400	45	654,000
Dufferin	160,900	30.41	4,892,700	2,800	34	94,000
Grey	438,950	34.49	15,137,680	10,400	51	529,000
Halton	124,250	29.69	3,689,420	4,500	32	146,000
Huron	388,800	41.45	16,116,850	11,600	80	928,000
Peel	155,820	26.10	4,067,360	5,300	19	103,000
Perth	335,430	35.67	11,964,450	8,200	83	682,000
Simcoe	397,800	32.02	12,738,090	10,800	14	152,000
Waterloo	198,250	36.88	7,312,380	4,400	54	238,000
Wellington	350,950	32.03	11,239,570	8,600	70	605,000
Western Ontario	**2,885,800**	**34.11**	**98,424,130**	**81,000**	**51**	**4,131,000**
Durham	185,150	29.96	5,546,470	5,500	22	122,000
Haliburton	27,440	22.91	628,600	100	30	3,000
Hastings	225,750	31.65	7,145,980	13,000	37	483,000
Muskoka	43,650	31.62	1,380,100	400	20	8,000
Northumberland	205,150	33.26	6,822,820	5,200	28	147,000
Ontario	229,300	37.07	8,501,150	5,200	11	57,000
Parry Sound	70,060	37.15	2,602,950	1,000	67	67,000
Peterborough	138,030	30.20	4,168,230	3,100	34	106,000
Prince Edward	96,620	34.86	3,368,550	3,000	16	48,000
Victoria	171,500	32.59	5,589,340	4,600	32	148,000
York	284,700	35.79	10,191,040	11,400	20	229,000
Central Ontario	**1,677,350**	**33.35**	**55,945,230**	**52,500**	**27**	**1,418,000**
Carleton	228,480	35.00	7,996,950	6,400	58	369,000
Dundas	122,680	31.50	3,864,670	1,300	24	31,000
Frontenac	139,530	31.88	4,447,890	2,800	19	53,000
Glengarry	126,890	26.29	3,336,400	3,100	27	84,000
Grenville	105,590	28.07	2,964,370	3,300	46	151,000
Lanark	168,650	30.95	5,220,720	7,000	56	390,000
Leeds	157,250	30.21	4,751,010	2,600	33	86,000
Lennox and Addington	156,690	27.94	4,377,550	2,800	13	36,000
Prescott	147,880	34.48	5,099,320	6,200	29	179,000
Renfrew	225,570	33.56	7,569,990	7,900	57	454,000
Russell	115,230	31.05	3,577,550	2,400	47	112,000
Stormont	101,890	31.42	3,201,850	5,200	48	248,000
Eastern Ontario	**1,796,330**	**31.40**	**56,408,270**	**51,000**	**43**	**2,193,000**
Algoma	52,450	28.51	1,495,330	200	60	12,000
Cochrane	39,090	31.26	1,221,920	700	80	56,000
Kenora	13,410	26.16	350,850	400	15	6,000
Manitoulin	43,950	29.21	1,283,800	100	50	5,000
Nipissing	56,660	31.10	1,761,960	100	60	6,000
Rainy River	57,200	35.68	2,040,810	600	112	67,000
Sudbury	64,025	39.16	2,507,020	....	......	....
Thunder Bay	48,155	39.05	1,880,460	....	......	....
Timiskaming	68,380	31.22	2,134,770	1,400	49	68,000
Northern Ontario	**443,320**	**33.11**	**14,676,920**	**3,500**	**63**	**220,000**
The Province, 1949	**9,380,600**	**36.17**	**339,310,000**	**249,900**	**43**	**10,809,000**

*Does not include sugar beets.

HORSES ON HAND

Showing by County Municipalities the number and value of Horses on hand June 1st, 1949.

Counties and Districts	Stallions, 2 yrs. old and over	Mares, 2 yrs. old and over	Geldings, 2 yrs. old and over	Colts and Fillies, under 2 years	Total Horses including Stallions	
					Number	Value
						$
Brant	30	2,400	2,300	200	4,930	426,800
Elgin	30	4,400	4,200	300	8,930	771,800
Essex	25	3,500	2,800	250	6,575	569,300
Haldimand	20	2,800	2,500	250	5,570	480,000
Kent	40	5,000	4,100	300	9,440	819,600
Lambton	45	6,400	5,500	500	12,445	1,075,100
Lincoln	10	1,900	1,800	100	3,810	329,900
Middlesex	80	8,400	6,800	600	15,880	1,377,600
Norfolk	35	3,800	4,100	150	8,085	702,400
Oxford	60	5,500	4,900	400	10,860	941,700
Welland	15	1,700	1,600	200	3,515	301,800
Wentworth	30	2,900	2,500	250	5,680	491,300
Southern Ontario	**420**	**48,700**	**43,100**	**3,500**	**95,720**	**8,287,300**
Bruce	70	7,500	6,200	600	14,370	1,259,900
Dufferin	35	3,800	2,400	350	6,585	577,800
Grey	65	10,000	8,900	600	19,565	1,715,700
Halton	25	2,000	1,900	100	4,025	355,100
Huron	60	9,000	7,100	600	16,760	1,470,500
Peel	30	3,000	2,400	300	5,730	501,000
Perth	45	6,700	5,500	500	12,745	1,116,000
Simcoe	75	8,200	5,800	650	14,725	1,293,600
Waterloo	50	4,900	4,300	500	9,750	851,400
Wellington	75	8,100	6,800	600	15,575	1,366,700
Western Ontario	**530**	**63,200**	**51,300**	**4,800**	**119,830**	**10,507,700**
Durham	45	4,300	2,500	360	7,205	697,800
Haliburton	10	900	800	60	1,770	171,500
Hastings	50	5,300	5,100	420	10,870	1,048,900
Muskoka	15	1,000	1,000	50	2,065	200,900
Northumberland	45	4,700	4,100	380	9,225	890,700
Ontario	50	5,200	5,000	350	10,600	1,024,900
Parry Sound	25	1,500	1,500	130	3,155	305,600
Peterborough	35	3,400	3,500	200	7,135	690,700
Prince Edward	20	2,800	2,000	130	4,950	480,600
Victoria	35	4,000	3,300	300	7,635	737,700
York	70	5,400	5,000	420	10,890	1,054,100
Central Ontario	**400**	**38,500**	**33,800**	**2,800**	**75,500**	**7,303,400**
Carleton	45	5,600	4,900	780	11,325	1,010,000
Dundas	30	3,700	2,900	250	6,880	624,700
Frontenac	20	3,800	2,800	250	6,870	623,900
Glengarry	35	3,200	2,900	350	6,485	582,500
Grenville	25	2,900	2,500	250	5,675	512,100
Lanark	50	5,000	4,400	400	9,850	890,200
Leeds	40	4,500	3,600	300	8,440	766,400
Lennox and Addington	30	3,800	3,400	250	7,480	676,900
Prescott	45	3,600	3,200	350	7,195	648,800
Renfrew	60	5,500	4,000	450	10,010	909,400
Russell	40	2,900	2,000	270	5,210	473,600
Stormont	40	2,500	1,800	200	4,540	414,100
Eastern Ontario	**460**	**47,000**	**38,400**	**4,100**	**89,960**	**8,132,600**
Algoma	20	1,400	1,300	110	2,830	306,200
Cochrane	30	1,300	1,100	90	2,520	274,700
Kenora	5	300	550	20	875	94,000
Manitoulin	15	900	900	100	1,915	206,000
Nipissing	20	1,100	850	100	2,070	224,400
Rainy River	20	1,100	1,100	90	2,310	250,000
Sudbury	35	1,700	1,400	120	3,255	354,400
Thunder Bay	15	900	800	40	1,755	191,500
Timiskaming	30	1,600	1,200	130	2,960	321,800
Northern Ontario	**190**	**10,300**	**9,200**	**800**	**20,490**	**2,223,000**
The Province, 1949	**2,000**	**207,700**	**175,800**	**16,000**	**401,500**	**36,454,000**

CATTLE ON HAND

Showing by County Municipalities the number of Cattle on hand, June 1st, 1949.

Counties and Districts	Bulls for breeding	Cows for milk purposes	Cows for beef purposes	Yearlings for milk purposes	Yearlings for beef purposes	Calves	Steers 1 year and over
Brant	800	15,000	700	3,600	700	6,500	2,400
Elgin	1,400	26,000	2,000	6,200	2,200	16,000	6,000
Essex	1,000	19,200	550	4,400	400	8,300	700
Haldimand	850	15,800	850	4,100	900	9,000	2,300
Kent	1,050	18,000	3,500	5,200	2,100	14,300	10,000
Lambton	1,400	31,500	3,850	7,200	6,000	25,000	15,000
Lincoln	500	10,000	350	2,500	300	3,800	700
Middlesex	2,700	47,000	8,000	12,400	7,000	30,000	20,000
Norfolk	750	14,400	200	4,800	500	7,200	700
Oxford	2,500	47,300	2,100	15,500	1,700	20,800	5,000
Welland	500	10,500	400	2,200	350	3,300	350
Wentworth	1,050	18,400	400	4,800	350	7,600	1,350
Southern Ontario	**14,500**	**273,100**	**22,900**	**72,900**	**22,500**	**151,800**	**64,500**
Bruce	2,300	37,500	8,800	8,800	10,500	34,000	25,000
Dufferin	1,000	16,200	2,600	3,600	4,500	13,000	10,500
Grey	2,900	45,000	8,000	10,000	12,000	38,500	29,000
Halton	900	14,600	750	4,600	1,100	7,700	1,600
Huron	2,600	43,900	8,700	11,000	12,000	34,100	24,000
Peel	1,300	23,000	1,000	8,000	1,100	11,000	2,900
Perth	2,600	44,000	3,000	13,000	5,500	25,600	8,500
Simcoe	2,200	42,900	4,000	9,700	5,900	26,000	15,500
Waterloo	1,400	25,300	800	7,200	1,300	13,700	6,000
Wellington	2,200	36,000	6,050	8,000	8,000	25,000	20,000
Western Ontario	**19,400**	**328,400**	**43,700**	**83,900**	**61,900**	**228,600**	**143,000**
Durham	1,100	19,900	3,500	5,800	2,500	15,300	5,000
Haliburton	200	3,800	200	800	250	3,200	600
Hastings	2,200	42,800	900	11,000	500	17,500	1,500
Muskoka	300	6,400	350	1,500	300	3,200	800
Northumberland	1,600	32,700	1,700	7,800	1,800	16,000	4,000
Ontario	1,900	33,900	3,700	9,000	3,200	19,700	7,600
Parry Sound	550	10,000	900	2,100	850	6,300	2,200
Peterborough	1,100	21,000	1,100	5,600	2,000	13,100	5,000
Prince Edward	750	13,600	300	4,800	150	7,100	100
Victoria	1,200	23,000	3,500	5,200	3,400	15,000	12,500
York	2,000	37,000	2,150	11,000	1,750	17,100	2,700
Central Ontario	**12,900**	**244,100**	**18,300**	**64,600**	**16,700**	**133,500**	**42,000**
Carleton	2,400	42,500	1,600	12,000	1,650	18,000	6,500
Dundas	1,800	32,000	200	9,100	250	10,000	50
Frontenac	1,550	27,500	600	8,100	600	15,000	1,300
Glengarry	1,650	29,000	200	8,200	100	10,000	100
Grenville	1,000	17,800	200	5,400	50	6,000	250
Lanark	1,600	29,000	1,900	8,100	3,100	21,000	8,000
Leeds	2,100	37,000	300	11,000	150	15,500	200
Lennox & Addington	1,300	23,000	700	6,600	600	11,200	1,800
Prescott	1,600	26,700	300	7,200	250	9,500	200
Renfrew	1,850	31,000	2,300	8,000	3,000	21,000	11,600
Russell	1,400	23,200	150	6,000	200	8,300	250
Stormont	1,350	23,600	150	5,700	50	6,700	50
Eastern Ontario	**19,600**	**342,300**	**8,600**	**95,400**	**10,000**	**152,200**	**30,300**
Algoma	400	6,000	900	2,000	650	4,000	1,200
Cochrane	580	7,500	250	2,300	300	4,500	450
Kenora	120	1,800	50	500	50	900	50
Manitoulin	300	7,100	1,400	1,300	1,300	5,500	3,500
Nipissing	700	9,400	300	2,600	350	5,600	1,200
Rainy River	350	5,300	300	1,400	300	4,100	800
Sudbury	750	9,600	400	2,800	250	5,300	650
Thunder Bay	400	7,700	150	1,600	100	4,000	150
Timiskaming	600	7,600	450	2,500	400	5,000	800
Northern Ontario	**4,200**	**62,000**	**4,200**	**17,000**	**3,700**	**38,900**	**8,800**
The Province, 1949	**70,600**	**1,249,900**	**97,700**	**333,800**	**114,800**	**705,000**	**288,600**

TOTAL CATTLE AND SWINE ON HAND

Showing by County Municipalities the number and value of Cattle, Swine on hand, June 1st, 1949.

Counties and Districts	Total Cattle		Swine		Total Swine	
	Number	Value	Six months and over	Under six months	Number	Value
		$				$
Brant	29,700	4,040,900	4,000	15,200	19,200	662,400
Elgin	59,800	7,700,000	11,100	36,000	47,100	1,671,300
Essex	34,550	4,773,200	9,300	27,000	36,300	1,314,900
Haldimand	33,800	4,420,900	4,900	22,000	26,900	902,700
Kent	54,150	6,697,800	23,300	62,000	85,300	3,141,900
Lambton	89,950	10,987,500	18,500	46,000	64,500	2,407,500
Lincoln	18,150	2,533,500	2,600	7,400	10,000	363,600
Middlesex	127,100	16,197,500	16,200	57,000	73,200	2,559,600
Norfolk	28,550	3,803,300	5,100	14,500	19,600	712,800
Oxford	94,900	12,857,400	17,000	72,000	89,000	3,015,000
Welland	17,600	2,537,600	2,300	6,300	8,600	315,000
Wentworth	33,950	4,685,900	5,000	22,000	27,000	909,000
Southern Ontario	**622,200**	**81,217,500**	**119,300**	**387,400**	**506,700**	**17,975,700**
Bruce	126,900	15,941,300	17,500	84,900	102,400	3,854,300
Dufferin	51,400	6,515,100	10,500	37,700	48,200	1,888,900
Grey	145,400	18,328,000	21,800	92,000	113,800	4,361,000
Halton	31,250	4,290,500	5,600	19,300	24,900	981,600
Huron	136,300	17,468,900	22,600	115,200	137,800	5,155,400
Peel	48,300	6,698,100	4,200	18,300	22,500	858,600
Perth	102,200	13,734,300	22,800	112,000	134,800	5,066,000
Simcoe	106,200	14,122,500	19,600	82,000	101,600	3,898,000
Waterloo	55,700	7,552,900	16,000	81,000	97,000	3,632,000
Wellington	105,250	13,700,900	29,300	124,000	153,300	5,872,500
Western Ontario	**908,900**	**118,352,500**	**169,900**	**766,400**	**936,300**	**35,568,300**
Durham	53,100	6,144,100	8,400	37,000	45,400	1,713,200
Haliburton	9,050	1,031,800	600	2,600	3,200	121,000
Hastings	76,400	9,804,900	14,600	49,000	63,600	2,487,800
Muskoka	12,850	1,593,700	1,000	2,500	3,500	143,000
Northumberland	65,600	8,146,200	10,500	43,000	53,500	2,037,500
Ontario	79,000	9,507,100	13,100	49,000	62,100	2,393,300
Parry Sound	22,900	2,736,900	1,000	5,300	6,300	232,600
Peterborough	48,900	5,788,800	5,600	25,000	30,600	1,152,800
Prince Edward	26,800	3,294,000	3,400	18,000	21,400	790,200
Victoria	63,800	7,475,700	10,300	38,000	48,300	1,864,900
York	73,700	9,207,900	15,500	55,000	70,500	2,736,500
Central Ontario	**532,100**	**64,731,100**	**84,000**	**324,400**	**408,400**	**15,672,800**
Carleton	84,650	10,254,400	6,500	24,100	30,600	1,174,200
Dundas	53,400	6,915,300	3,900	17,600	21,500	805,000
Frontenac	54,650	6,453,000	4,500	22,000	26,500	983,000
Glengarry	49,250	6,304,700	3,800	15,200	19,000	722,000
Grenville	30,700	3,921,300	2,800	11,000	13,800	525,600
Lanark	72,700	7,953,400	6,600	29,400	36,000	1,350,000
Leeds	66,250	8,225,700	4,500	16,000	20,500	791,000
Lennox and Addington	45,200	5,422,700	4,800	15,000	19,800	777,600
Prescott	45,750	5,836,000	6,000	26,700	32,700	1,226,400
Renfrew	78,750	8,688,100	7,400	22,000	29,400	1,162,800
Russell	39,500	5,041,600	6,400	20,700	27,100	1,059,200
Stormont	37,600	4,975,800	4,400	18,000	22,400	848,800
Eastern Ontario	**658,400**	**79,992,000**	**61,600**	**237,700**	**299,300**	**11,425,600**
Algoma	15,150	1,640,600	800	4,600	5,400	158,200
Cochrane	15,880	1,760,900	1,200	4,500	5,700	177,300
Kenora	3,470	399,500	300	500	800	28,700
Manitoulin	20,400	2,147,300	800	4,000	4,800	143,200
Nipissing	20,150	2,235,000	1,500	5,000	6,500	206,000
Rainy River	12,550	1,326,300	900	2,200	3,100	103,600
Sudbury	19,750	2,231,500	1,600	6,000	7,600	236,400
Thunder Bay	14,100	1,631,000	600	2,000	2,600	82,400
Timiskaming	17,350	1,886,700	1,200	4,700	5,900	182,300
Northern Ontario	**138,800**	**15,258,800**	**8,900**	**33,500**	**42,400**	**1,318,100**
The Province, 1949	**2,860,400**	**359,551,900**	**443,700**	**1,749,400**	**2,193,100**	**81,960,500**

TOTAL SHEEP AND LAMBS ON HAND

Showing by County Municipalities the numbers and value of Sheep and Lambs on hand, June 1st, 1949.

Counties and Districts	Sheep and Lambs			Total Sheep and Lambs	
	Ewes 1 year and over	Rams 1 year and over	Lambs Under 1 year	Number	Value
					$
Brant	1,800	100	2,000	3,900	68,400
Elgin	5,700	310	6,300	12,310	215,900
Essex	1,700	100	2,000	3,800	66,600
Haldimand	2,800	160	3,000	5,960	104,600
Kent	2,500	150	2,600	5,250	92,200
Lambton	9,100	500	10,000	19,600	343,800
Lincoln	1,800	100	1,900	3,800	66,700
Middlesex	7,900	450	8,000	16,350	287,200
Norfolk	2,200	130	2,300	4,630	81,300
Oxford	2,500	150	2,700	5,350	93,900
Welland	700	50	800	1,550	27,200
Wentworth	1,600	100	1,700	3,400	59,700
Southern Ontario	**40,300**	**2,300**	**43,300**	**85,900**	**1,507,500**
Bruce	8,400	480	8,700	17,580	317,900
Dufferin	9,400	570	10,500	20,470	370,200
Grey	19,000	1,050	22,500	42,550	769,100
Halton	2,700	160	2,800	5,660	102,400
Huron	7,000	470	8,000	15,470	279,900
Peel	3,000	160	2,900	6,060	109,600
Perth	2,200	150	2,600	4,950	89,600
Simcoe	15,400	900	16,000	32,300	584,100
Waterloo	1,100	60	1,400	2,560	46,300
Wellington	6,500	400	7,000	13,900	251,400
Western Ontario	**74,700**	**4,400**	**82,400**	**161,500**	**2,920,300**
Durham	5,400	370	6,000	11,770	202,800
Haliburton	800	50	900	1,750	30,200
Hastings	6,400	320	7,300	14,020	241,400
Muskoka	1,000	50	1,000	2,050	35,100
Northumberland	4,100	250	4,000	8,350	142,800
Ontario	7,400	400	8,100	15,900	273,300
Parry Sound	2,900	160	3,400	6,460	111,500
Peterborough	3,900	240	3,700	7,840	133,800
Prince Edward	2,500	140	2,700	5,340	91,700
Victoria	9,000	560	8,200	17,760	302,600
York	6,500	360	6,000	12,860	219,100
Central Ontario	**49,900**	**2,900**	**51,300**	**104,100**	**1,784,300**
Carleton	5,200	300	5,200	10,700	172,100
Dundas	500	30	500	1,030	16,600
Frontenac	2,900	190	3,000	6,090	98,000
Glengarry	800	60	900	1,760	28,300
Grenville	2,600	160	2,700	5,460	87,800
Lanark	11,500	700	11,000	23,200	373,300
Leeds	4,100	230	4,400	8,730	140,400
Lennox and Addington	2,800	160	2,700	5,660	91,000
Prescott	1,000	60	1,100	2,160	34,700
Renfrew	16,500	1,020	17,000	34,520	555,400
Russell	800	60	800	1,660	26,700
Stormont	500	30	500	1,030	16,600
Eastern Ontario	**49,200**	**3,000**	**49,800**	**102,000**	**1,640,900**
Algoma	4,100	230	4,400	8,730	118,800
Cochrane	900	60	1,000	1,960	26,700
Kenora	300	20	350	670	9,100
Manitoulin	8,700	450	9,500	18,650	253,800
Nipissing	1,900	120	2,100	4,120	56,100
Rainy River	6,600	340	7,500	14,440	196,600
Sudbury	1,000	60	1,000	2,060	28,000
Thunder Bay	900	60	800	1,760	23,900
Timiskaming	3,000	160	2,750	5,910	80,200
Northern Ontario	**27,400**	**1,500**	**29,400**	**58,300**	**793,200**
The Province, 1949	**241,500**	**14,100**	**256,200**	**511,800**	**8,646,200**

POULTRY ON HAND

Showing by County Municipalities the number and value of Poultry on hand, June 1st, 1949.

Counties and Districts	Turkeys	Geese	Ducks	Other Fowls	Total Poultry	
					Number	Value
						$
Brant	2,300	2,910	1,700	360,000	366,910	452,700
Elgin	33,500	3,490	3,600	555,000	595,590	805,500
Essex	15,200	14,380	4,400	871,000	904,980	1,161,200
Haldimand	18,700	4,300	2,700	573,000	598,700	773,500
Kent	10,200	27,350	5,400	1,096,000	1,138,950	1,417,600
Lambton	71,300	13,820	10,000	1,502,000	1,597,120	2,148,400
Lincoln	15,200	6,320	2,000	347,000	370,520	488,700
Middlesex	71,500	12,380	7,200	1,131,000	1,222,080	1,669,100
Norfolk	7,200	3,730	1,800	485,000	497,730	622,900
Oxford	7,900	7,660	5,200	877,000	897,760	1,134,800
Welland	5,500	3,900	1,500	223,000	233,900	299,200
Wentworth	3,700	3,510	2,300	456,000	465,510	576,400
Southern Ontario	**262,200**	**103,750**	**47,800**	**8,476,000**	**8,889,750**	**11,550,000**
Bruce	23,900	5,520	7,200	820,000	856,620	1,104,900
Dufferin	1,000	2,410	6,300	352,000	361,710	450,300
Grey	8,800	10,980	10,600	701,000	731,380	924,700
Halton	7,900	9,230	3,000	345,000	365,130	467,400
Huron	3,600	13,300	6,600	1,146,000	1,169,500	1,437,200
Peel	14,900	12,940	5,800	388,000	421,640	557,400
Perth	5,400	7,820	7,500	848,000	868,720	1,077,400
Simcoe	17,300	6,900	10,900	663,000	698,100	903,700
Waterloo	6,500	2,380	3,700	595,000	607,580	756,700
Wellington	3,400	5,640	7,500	935,000	951,540	1,172,300
Western Ontario	**92,700**	**77,120**	**69,100**	**6,793,000**	**7,031,920**	**8,852,000**
Durham	3,600	3,440	3,200	475,000	485,240	601,400
Haliburton	1,400	110	400	28,000	29,910	40,100
Hastings	8,000	1,930	2,200	347,000	359,130	457,200
Muskoka	600	440	300	95,000	96,340	118,600
Northumberland	6,200	2,410	3,400	545,000	557,010	694,300
Ontario	15,300	4,460	5,000	570,000	594,760	764,300
Parry Sound	2,300	430	1,200	95,000	98,930	127,000
Peterborough	7,400	1,180	3,500	231,000	243,080	317,100
Prince Edward	1,500	1,100	1,000	262,000	265,600	326,700
Victoria	6,400	2,310	6,000	432,000	446,710	565,300
York	15,100	17,210	6,600	810,000	848,910	1,077,300
Central Ontario	**67,800**	**35,020**	**32,800**	**3,890,000**	**4,025,620**	**5,089,300**
Carleton	2,6200	5,910	4,900	463,000	500,010	675,400
Dundas	4,600	2,000	3,300	417,000	426,900	532,900
Frontenac	22,800	2,100	2,000	180,000	206,900	307,300
Glengarry	9,400	800	400	235,000	245,600	320,000
Grenville	8,300	1,510	1,400	250,000	261,210	338,000
Lanark	17,600	630	1,200	350,000	369,430	490,200
Leeds	12,200	2,890	1,600	285,000	301,690	396,800
Lennox and Addington	7,500	3,170	1,900	360,000	372,570	472,100
Prescott	6,800	640	1,100	234,000	242,540	311,200
Renfrew	14,300	1,110	3,500	390,000	408,910	533,900
Russell	900	580	2,700	232,000	236,180	292,200
Stormont	5,100	620	1,000	325,000	331,720	415,000
Eastern Ontario	**135,700**	**21,960**	**25,000**	**3,721,000**	**3,903,660**	**5,085,000**
Algoma	7,400	290	1,500	125,000	134,190	182,100
Cochrane	800	400	300	117,000	118,500	145,800
Kenora	1,100	160	200	30,000	31,460	41,000
Manitoulin	21,900	220	800	39,000	61,920	127,500
Nipissing	1,200	130	500	57,000	58,830	74,800
Rainy River	4,800	260	500	90,000	95,560	127,700
Sudbury	1,700	210	500	92,000	94,410	119,000
Thunder Bay	1,600	240	300	160,000	162,140	200,500
Timiskaming	1,100	240	700	110,000	112,040	139,300
Northern Ontario	**41,600**	**2,150**	**5,300**	**820,000**	**869,050**	**1,157,700**
The Province, 1949	**600,000**	**240,000**	**180,000**	**23,700,000**	**24,720,000**	**31,734,000**

CHATTEL MORTGAGES

Table showing by County Municipalities of Ontario the total number and amount of Chattel Mortgages on record and undischarged on December 31st, for the years 1947, 1948 and 1949, together with totals for the Province for all occupations as well as for "farmers", as far as given in the records.

Counties and Districts	1949		1948		1947	
	No.	Amount	No.	Amount	No.	Amount
		$		$		$
Brant	1,089	1,519,493	1,250	1,362,294	1,086	1,289,047
Elgin	831	1,710,005	898	1,910,192	699	1,013,469
Essex	5,556	6,336,056	5,561	5,776,165	5,174	5,621,394
Haldimand	352	362,570	308	319,178	273	384,795
Kent	1,735	2,008,211	1,242	1,847,223	875	1,320,401
Lambton	1,635	2,034,720	1,446	1,616,499	1,139	1,079,115
Lincoln	2,415	2,808,908	2,063	2,768,570	1,422	1,634,533
Middlesex	3,975	4,145,580	3,677	3,636,404	3,196	2,934,760
Norfolk	430	796,235	496	907,171	358	679,370
Oxford	1,131	1,748,663	917	1,625,120	873	1,653,786
Welland	3,315	9,937,215	3,464	3,460,063	2,674	2,880,290
Wentworth	6,875	7,277,164	5,983	5,905,884	4,704	5,154,615
Southern Ontario	**29,339**	**40,684,820**	**27,305**	**31,134,763**	**22,473**	**25,645,575**
Bruce	316	705,918	239	506,165	180	395,191
Dufferin	90	240,455	89	227,613	82	233,564
Grey	694	1,093,211	615	903,444	556	880,134
Halton	663	1,389,464	604	1,391,642	408	580,895
Huron	534	705,148	500	639,325	402	684,452
Peel	894	934,976	780	987,422	468	564,667
Perth	700	930,769	718	850,746	567	468,582
Simcoe	1,816	2,343,655	1,454	1,811,961	945	1,756,678
Waterloo	2,913	3,151,184	2,432	2,506,214	1,699	2,235,755
Wellington	884	1,563,276	976	1,263,812	1,016	1,236,162
Western Ontario	**9,504**	**13,058,056**	**8,407**	**11,088,344**	**6,323**	**9,036,080**
Hastings	1,982	1,507,275	1,848	1,923,564	1,347	1,390,518
Muskoka	321	768,377	255	542,485	148	432,308
Northumberland and Durham	821	1,294,747	658	1,027,642	473	972,398
Ontario	1,164	1,827,484	929	1,219,593	908	933,287
Parry Sound	226	382,343	253	530,510	241	468,954
Peterborough	1,629	17,540,737	1,167	1,085,729	758	1,125,743
Prince Edward	316	443,556	255	439,699	230	402,302
Victoria and Haliburton	382	619,939	314	542,829	211	451,672
York	29,837	35,515,484	33,325	32,231,621	23,659	28,002,274
Central Ontario	**36,678**	**59,899,942**	**39,004**	**39,543,672**	**27,975**	**34,179,456**
Carleton	4,938	5,214,209	4,133	4,841,287	3,280	4,022,628
Frontenac	1,706	1,060,100	1,410	1,034,808	1,135	819,295
Lanark	468	663,401	386	610,033	203	375,729
Leeds and Grenville	916	1,043,668	780	1,052,136	376	610,642
Lennox and Addington	328	509,699	231	507,692	216	492,928
Prescott and Russell	465	999,545	367	803,656	305	767,929
Renfrew	484	948,470	401	794,063	185	732,069
Stormont, Dundas and Glengarry	1,488	1,753,396	1,298	1,711,679	1,613	1,559,808
Eastern Ontario	**10,793**	**12,192,488**	**9,006**	**11,355,354**	**7,313**	**9,381,028**
Algoma	1,213	1,474,363	1,198	981,509	771	660,806
Cochrane	1,073	1,354,586	1,499	2,580,212	1,155	2,351,568
Kenora	506	924,648	446	616,191	483	749,311
Manitoulin	27	60,716	30	66,481	38	51,113
Nipissing	899	2,034,505	794	1,662,020	496	1,018,167
Rainy River	237	297,458	253	382,723	263	388,381
Sudbury	1,538	3,110,026	1,520	2,508,656	1,331	1,831,256
Thunder Bay	2,645	3,884,087	2,543	2,893,038	2,316	2,338,482
Timiskaming	1,052	1,619,482	950	1,462,653	851	932,638
Northern Ontario	**9,190**	**14,759,871**	**9,233**	**13,153,483**	**7,704**	**10,321,722**
Total:						
All occupations	**95,504**	**140,595,177**	**92,955**	**106,275,616**	**71,788**	**110,563,634**
Farmers as given	**210**	**5,148,876**	**2,453**	**5,832,284**	**3,394**	**6,511,584**

Fall Wheat and Spring Wheat

The following table gives the area, production and farm value of Fall Wheat and Spring Wheat for the years 1887 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Fall Wheat				Spring Wheat			
	Acres	Per acre	Bushels	Farm Value	Acres	Per acre	Bushels	Farm value
				$				$
1949	805,000	30.7	24,714,000	42,755,000	59,000	18.0	1,062,000	1,837,000
1948	858,500	30.3	26,013,000	53,847,000	52,300	22.2	1,161,000	2,403,000
1947	712,300	24.9	17,736,000	25,146,000	31,100	18.1	563,000	839,000
1946	546,100	29.8	16,274,000	20,017,000	38,000	22.0	836,000	1,018,000
1945	675,000	29.8	20,115,000	21,724,000	36,000	19.8	713,000	770,000
1944	668,000	31.3	20,908,000	22,790,000	37,800	20.4	771,000	833,000
1943	601,000	22.0	13,222,000	14,148,000	37,800	16.8	635,000	673,000
1942	757,000	30.9	23,391,000	20,584,000	42,000	20.5	861,000	758,000
1941	565,500	26.6	15,042,000	14,139,000	45,300	18.4	834,000	751,000
1940	775,400	28.5	22,099,000	13,922,000	69,200	18.8	1,301,000	846,000
1939	734,988	30.3	22,271,000	14,253,000	81,757	18.9	1,550,000	1,023,000
1938	742,062	26.7	19,805,775	11,082,514	88,001	18.1	1,592,289	923,545
1937	718,813	26.0	18,691,535	19,427,921	94,174	17.0	1,600,648	1,638,457
1936	509,306	24.5	12,478,456	13,601,343	97,972	17.7	1,735,147	1,874,293
1935	555,073	22.7	12,600,690	8,946,898	98,807	18.8	1,857,135	1,356,077
1934	425,594	15.8	6,724,089	5,917,025	96,373	18.7	1,803,088	1,533,062
1933	558,970	25.1	14,030,553	9,259,526	96,701	17.2	1,662,969	1,114,229
1932	536,292	28.1	15,061,600	6,929,113	100,068	19.9	1,990,368	895,980
1931	525,024	28.6	15,013,555	7,747,787	90,183	20.0	1,982,594	1,008,547
1930	676,802	26.7	18,047,207	11,958,527	98,966	22.0	2,179,204	1,426,734
1929	691,662	25.8	17,820,739	22,092,590	106,610	18.1	1,929,892	2,416,054
1928	693,660	24.2	16,766,408	20,456,753	109,805	19.9	2,181,855	2,599,815
1927	751,377	25.9	19,447,536	24,254,806	119,580	20.1	2,408,055	2,939,777
1926	807,015	26.0	20,988,030	26,262,506	115,497	18.8	2,166,054	2,708,690
1925	747,101	30.5	22,764,736	30,420,639	113,338	21.5	2,440,632	3,245,576
1924	722,366	29.6	21,396,621	28,646,679	101,401	19.2	1,948,853	2,669,773
1923	717,307	23.1	16,599,067	15,976,322	111,601	17.4	1,937,937	1,865,540
1922	813,935	21.9	17,792,958	18,616,746	124,206	16.9	2,099,503	2,207,565
1921	621,420	22.0	13,667,879	15,096,980	152,904	12.5	1,907,459	2,087,264
1920	762,371	24.3	18,492,013	35,759,610	267,367	16.8	4,480,472	8,237,182
1919	619,494	24.3	15,051,703	35,698,096	361,150	15.6	5,646,544	13,603,841
1918	362,616	19.5	7,054,845	14,877,794	351,423	23.3	8,186,191	17,076,203
1917	585,946	22.8	13,384,207	28,078,738	182,957	20.1	3,679,516	7,716,693
1916	704,867	21.2	14,942,050	24,099,591	144,305	15.3	2,213,961	3,591,681
1915	811,185	30.5	24,737,011	24,023,286	162,142	21.2	3,439,949	3,392,996
1914	685,692	20.9	14,333,548	15,641,232	118,607	18.3	2,169,425	2,340,520
1913	646,533	24.7	15,945,717	13,550,459	116,581	17.7	2,068,951	1,818,652
1912	759,888	19.8	15,039,885	13,795,968	123,080	18.7	2,302,339	2,072,266
1911	837,492	21.4	17,926,586	15,519,411	133,711	17.2	2,295,534	2,081,580
1910	743,473	26.7	19,837,172	17,172,678	129,319	19.3	2,489,833	2,229,999
1909	663,375	24.1	15,967,653	16,335,950	135,161	16.5	2,223,567	2,237,189
1908	679,642	24.2	16,430,476	14,649,061	142,124	15.5	2,197,716	1,996,230
1907	676,164	23.0	15,545,491	14,410,670	144,514	17.1	2,473,651	2,137,234
1906	787,287	23.9	18,841,774	13,321,134	171,745	19.0	3,267,000	2,250,963
1905	796,213	22.5	17,933,961	13,719,480	190,116	18.8	3,582,627	2,683,387
1904	605,458	15.1	9,160,623	9,041,535	225,027	15.4	3,471,103	3,269,779
1903	665,028	25.9	17,242,763	12,949,315	248,518	18.7	4,650,707	3,460,126
1902	748,592	27.0	20,233,669	14,305,204	303,115	20.0	6,048,024	4,209,425
1901	911,587	17.5	15,943,229	10,538,474	358,048	15.4	5,498,751	3,673,166
1900	1,068,640	21.9	23,369,737	15,517,505	376,905	18.4	6,940,333	4,684,725
1899	1,049,691	13.8	14,439,827	9,631,365	398,726	17.7	7,041,317	4,682,476
1898	1,048,182	24.0	25,158,713	17,460,147	389,205	17.7	6,873,785	4,756,659
1897	950,222	25.2	23,988,051	18,758,656	323,305	15.1	4,868,101	4,826,327
1896	876,955	17.2	15,078,441	10,705,693	255,361	13.8	3,519,322	2,484,641
1895	743,199	19.0	14,155,282	9,809,610	223,957	15.5	3,472,543	2,423,835
1894	778,992	21.2	16,512,106	9,081,658	230,016	14.6	3,367,854	1,869,159
1893	913,954	19.2	17,545,248	10,509,604	356,721	11.7	4,186,063	2,486,521
1892	966,522	21.2	20,492,497	14,488,195	651,302	12.7	8,290,395	5,620,888
1891	849,956	25.7	21,872,488	20,800,736	510,634	21.0	10,711,538	9,951,019
1890	720,101	19.8	14,267,383	13,439,875	601,753	12.8	7,683,905	7,015,405
1889	822,115	15.8	13,001,865	11,493,648	398,610	14.3	5,697,707	5,019,680
1888	826,537	16.7	13,830,787	14,162,726	367,850	17.5	6,453,559	6,408,384
1887	897,743	16.1	14,440,611	11,321,439	484,821	11.6	5,633,117	4,393,831
Annual Averages:								
1932–1941	612,200	25.9	15,880,470	11,747,834	86,835	18.3	1,592,664	1,195,564
1922–1931	714,625	26.1	18,663,676	20,643,336	110,019	19.3	2,127,458	2,308,807
1912–1921	656,001	23.3	15,264,886	22,062,175	198,052	18.2	3,609,481	6,193,730
1902–1911	720,272	23.5	16,912,017	14,142,444	182,335	17.9	3,269,976	2,655,591
1882–1949	749,800	23.5	17,600,800	17,573,200	225,000	18.3	4,123,200	3,658,400

Oats and Barley

The following table gives the area, production and farm value of Oats and Barley for the years 1887 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Oats				Barley			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
1949	2,086,000	34.5	71,967,000	56,134,000	228,000	30.3	6,908,000	8,082,000
1948	1,835,600	41.8	76,728,000	62,917,000	226,100	34.4	7,778,000	8,634,000
1947	1,288,500	32.2	41,490,000	37,341,000	228,000	26.9	6,133,000	6,930,000
1946	1,635,000	43.9	71,776,000	38,760,000	293,000	36.7	10,753,000	7,742,000
1945	1,522,000	35.4	53,879,000	30,172,000	305,000	30.8	9,394,000	6,670,000
1944	1,716,000	38.9	66,752,000	36,714,000	331,000	33.8	11,188,000	7,608,000
1943	1,957,000	23.8	34,677,000	19,072,000	279,000	23.0	6,417,000	4,235,000
1942	1,966,000	43.0	84,538,000	37,197,000	353,000	34.5	12,179,000	6,942,000
1941	1,965,000	33.0	64,845,000	28,532,000	363,700	28.7	10,438,000	5,845,000
1940	2,254,000	38.4	86,554,000	27,697,000	499,000	31.1	15,519,000	6,828,000
1939	2,274,126	38.1	86,639,000	29,457,000	522,232	31.8	16,600,000	7,636,000
1938	2,262,930	27.9	83,198,318	23,231,985	544,017	30.6	16,648,991	6,798,249
1937	2,263,935	32.6	73,712,228	31,035,041	555,939	28.8	16,029,856	9,380,594
1936	2,345,906	28.5	66,857,962	32,091,668	519,233	27.0	14,018,054	11,214,391
1935	2,376,736	36.0	85,560,799	23,957,144	523,035	32.2	16,841,004	6,736,335
1934	2,390,817	34.1	81,526,069	28,534,021	484,908	30.4	14,741,263	7,370,538
1933	2,315,700	28.3	65,543,218	21,629,214	461,226	26.1	12,037,325	4,935,203
1932	2,338,569	32.3	75,517,411	18,878,732	456,000	30.2	13,771,000	4,958,004
1931	2,330,128	33.5	77,979,490	19,499,057	437,588	30.6	13,407,038	4,898,775
1930	2,468,913	39.5	97,481,866	28,983,780	609,879	34.3	20,910,731	7,496,760
1929	2,335,310	31.5	73,640,478	45,918,227	622,063	29.0	18,032,191	13,799,386
1928	2,659,980	35.1	93,461,068	51,912,665	615,433	32.4	19,944,133	14,790,285
1927	2,689,295	37.9	101,913,746	58,438,236	514,802	33.5	17,238,125	13,382,864
1926	2,831,755	33.8	95,722,130	49,615,846	449,095	32.2	14,447,174	9,823,171
1925	2,837,390	41.6	118,100,471	53,404,626	436,383	34.2	14,917,247	10,160,463
1924	2,891,990	39.5	114,249,129	61,899,999	439,177	33.2	14,570,403	11,970,808
1923	2,967,417	34.9	103,485,442	46,937,124	452,490	29.9	13,523,349	8,487,609
1922	3,034,090	38.2	116,033,569	50,450,114	433,922	32.2	13,971,811	8,561,782
1921	3,094,958	23.4	72,575,191	36,555,194	462,176	22.0	10,149,353	6,665,865
1920	2,880,053	44.9	129,171,312	75,159,913	484,328	34.4	16,660,350	15,631,613
1919	2,674,341	29.3	78,388,018	76,572,899	569,183	23.1	13,133,757	19,146,902
1918	2,924,468	45.1	131,752,601	98,798,745	660,404	36.7	24,247,673	25,112,912
1917	2,763,355	40.3	111,232,817	86,640,057	551,298	33.4	18,387,741	23,118,166
1916	2,689,762	26.5	71,297,528	47,066,428	527,886	23.5	12,388,969	12,621,940
1915	2,871,755	41.9	120,217,952	47,452,121	552,318	36.0	19,893,129	11,130,811
1914	2,776,883	37.3	103,564,322	51,232,043	579,473	31.2	18,096,754	11,640,790
1913	2,699,459	36.5	98,426,902	36,342,489	623,658	29.3	18,255,958	10,136,759
1912	2,601,735	37.8	98,444,807	38,005,016	647,382	29.7	19,232,275	11,296,962
1911	2,699,230	31.4	84,829,232	37,494,695	616,977	26.3	16,248,129	12,000,154
1910	2,757,933	37.0	102,084,924	35,698,964	626,144	30.5	19,103,107	9,930,410
1909	2,695,585	33.5	90,235,579	35,612,676	695,262	27.0	18,776,777	10,286,328
1908	2,774,259	34.8	96,626,419	38,987,985	734,029	28.5	20,888,569	10,943,788
1907	2,932,509	28.5	83,524,301	40,759,859	766,891	28.3	21,718,332	12,900,689
1906	2,716,711	39.9	108,341,455	36,836,095	756,163	33.4	25,253,011	11,363,855
1905	2,668,416	39.6	105,563,572	35,469,360	772,633	31.4	24,265,394	10,409,854
1904	2,654,936	38.5	102,173,443	33,002,022	772,434	31.8	24,567,825	10,736,140
1903	2,638,665	41.6	109,874,053	32,193,097	709,839	34.3	24,378,817	10,263,482
1902	2,500,758	42.6	106,431,439	37,038,141	661,622	33.1	21,890,602	9,872,661
1901	2,408,264	32.5	78,334,490	28,357,085	637,201	26.3	16,761,076	7,542,484
1900	2,398,834	37.4	89,693,327	23,768,732	577,810	29.3	16,909,751	6,577,893
1899	2,363,778	38.0	89,897,724	24,901,670	490,374	30.2	14,830,891	5,858,202
1898	2,376,360	36.6	86,858,293	22,409,440	438,784	28.9	12,663,668	4,812,194
1897	2,432,491	35.5	86,318,128	19,507,897	451,515	26.6	12,021,779	3,245,880
1896	2,425,107	34.2	82,979,992	16,595,998	462,792	27.4	12,669,744	4,003,639
1895	2,373,309	35.7	84,697,566	24,646,992	478,046	25.3	12,090,507	4,884,565
1894	2,342,766	30.0	70,172,516	21,613,135	486,261	22.6	10,980,404	4,447,064
1893	1,936,644	30.3	58,584,529	19,450,064	467,315	21.0	9,806,088	3,932,241
1892	1,861,469	34.8	64,758,053	19,945,480	499,225	24.6	12,274,318	5,069,293
1891	1,840,636	40.8	75,009,542	27,378,483	553,166	29.2	16,141,904	7,925,675
1890	1,882,366	28.0	52,768,207	21,687,734	701,326	22.2	15,600,169	7,831,285
1889	1,923,444	33.5	64,346,301	19,625,622	875,286	26.7	23,386,388	10,290,011
1888	1,849,868	35.4	65,466,911	26,514,099	895,432	26.1	23,366,569	14,043,308
1887	1,682,463	29.6	49,848,101	17,247,443	767,346	22.3	17,134,830	9,715,448
Annual Averages:								
1932–1941	2,278,772	33.8	76,995,402	26,504,381	492,929	29.7	14,664,449	7,170,231
1922–1931	2,704,627	36.7	99,206,739	46,705,967	501,083	32.1	16,096,220	10,337,190
1912–1921	2,797,677	36.3	101,507,145	59,382,491	565,811	30.1	17,044,596	14,650,272
1902–1911	2,703,900	36.6	98,968,442	36,309,289	711,199	30.5	21,709,056	10,870,736
1882–1949	2,344,100	35.4	83,014,400	36,009,300	549,600	29.2	16,035,300	9,455,500

Dry Peas and Dry Beans

The following table gives the area, production and farm value of Peas and Beans for the years 1887 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Dry Peas				Dry Beans			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
1949	25,400	15.4	391,000	966,000	80,900	19.5	1,578,000	5,239,000
1948	29,700	21.9	650,000	1,859,000	78,300	17.9	1,402,000	5,762,000
1947	43,500	14.8	644,000	1,932,000	84,100	15.0	1,262,000	6,903,000
1946	34,300	21.0	720,000	2,045,000	76,800	17.3	1,328,000	3,944,000
1945	23,500	15.2	357,000	1,071,000	81,500	13.0	1,060,000	2,650,000
1944	34,600	16.8	581,000	1,598,000	82,500	14.0	1,155,000	2,888,000
1943	32,000	16.0	512,000	1,055,000	68,000	17.0	1,156,000	2,485,000
1942	34,000	16.9	575,000	1,144,000	62,000	20.2	1,252,000	1,878,000
1941	35,900	15.6	560,000	1,047,000	94,100	16.9	1,588,000	2,630,000
1940	55,200	16.2	894,000	1,672,000	84,800	14.9	1,264,000	2,212,000
1939	51,902	17.1	887,000	1,570,000	62,527	21.4	1,338,000	3,011,000
1938	52 405	17.2	899,103	1,348,680	59,727	22.9	1,366,018	1,366,018
1937	58,358	13.6	796,208	1,242,687	57,175	19.3	1,105,660	1,178,628
1936	66,831	12.2	815,101	1,263,360	56,344	13.2	743,037	1,501,391
1935	68,709	17.0	1,168,244	1,109,639	56,987	18.1	1,031,871	1,496,499
1934	68,811	16.8	1,156,027	983,041	49,445	14.0	692,025	878,504
1933	58,746	16.0	938,755	750,856	52,320	14.9	779,476	717,326
1932	59,535	18.0	1,071,344	696,348	61,821	17.1	1,059,559	519,132
1931	58,944	16.5	972,832	608,586	76,312	15.5	1,184,172	685,934
1930	80,093	19.7	1,581,468	1,657,822	67,540	13.4	905,498	1,306,852
1929	79,523	15.5	1,235,658	2,013,945	63,732	17.5	1,113,310	3,373,233
1928	109,887	17.2	1,892,588	2,892,490	50,953	17.1	873,427	3,343,825
1927	105,662	19.3	2,035,687	3,049,924	47,156	15.4	725,011	1,700,257
1926	97,865	19.2	1,880,301	2,831,588	51,721	15.8	819,166	1,913,221
1925	133,434	19.5	2,607,287	3,532,258	61,080	18.9	1,154,317	2,431,446
1924	130,989	18.8	2,456,164	3,712,042	52,047	16.5	856,860	1,958,602
1923	117,409	17.3	2,030,850	2,940,685	41,127	15.4	633,713	1,538,701
1922	105,544	19.7	2,076,965	2,914,720	39,999	15.6	622,781	1,579,549
1921	105,964	13.6	1,441,095	2,205,423	26,509	16.1	427,531	1,005,057
1920	109,187	20.2	2,209,523	4,270,938	22,744	16.7	380,499	1,097,137
1919	127,253	14.3	1,816,517	4,794,268	22,920	12.6	288,480	1,154,081
1918	113,862	20.9	2,381,937	5,184,332	100,082	13.9	1,387,834	6,230,007
1917	90,322	16.7	1,512,567	4,855,888	110,680	9.7	1,078,510	7,446,626
1916	95,542	13.4	1,243,979	2,618,754	53,999	10.8	583,105	3,183,086
1915	126,943	16.1	2,043,049	3,302,641	62,863	14.0	882,819	2,745,105
1914	177,856	14.7	2,609,585	3,565,974	51,149	16.3	835,895	1,787,432
1913	177,303	17.5	3,108,263	3,127,551	66,639	15.3	1,021,243	1,738,900
1912	221,524	16.6	3,667,005	4,047,354	69,703	17.0	1,182,132	2,280,173
1911	304,491	14.7	4,462,182	4,380,883	51,508	17.4	898,212	1,711,089
1910	403,414	14.9	6,016,003	4,856,986	49,778	17.9	892,927	1,386,798
1909	381,609	20.0	7,613,656	6,437,685	45,029	18.4	826,344	1,334,325
1908	396,642	18.7	7,401,336	6,121,449	46,477	16.9	783,757	1,160,103
1907	340,977	21.6	7,365,036	5,744,728	47,562	16.6	790,269	1,201,209
1906	410,356	18.0	7,388,987	5,216,625	51,272	18.5	950,312	1,320,934
1905	374,518	19.0	7,100,021	4,636,314	50,543	16.7	846,443	1,117,305
1904	339,260	19.5	6,629,866	4,176,816	50,892	17.9	912,849	1,113,676
1903	407,133	21.9	8,924,650	5,738,550	53,039	18.4	978,246	1,379,327
1902	532,639	14.4	7,664,679	5,441,922	53,964	12.4	670,633	905,355
1901	602,724	16.7	10,089,173	6,588,230	53,688	15.4	824,122	1,030,153
1900	661,592	21.2	14,058,198	8,027,231	44,053	18.6	820,373	817,912
1899	743,139	20.4	15,140,790	8,675,673	40,485	16.1	651,009	703,090
1898	865,951	15.6	13,521,263	7,058,099	45,220	16.8	759,657	531,760
1897	896,735	15.5	13,867,093	5,838,046	50,591	19.4	981,340	639,834
1896	829,601	21.1	17,493,148	7,696,985	68,369	17.5	1,197,535	819,114
1895	799,963	19.5	15,568,103	8,531,320	72,747	20.5	1,494,179	1,414,988
1894	785,007	17.9	14,022,888	7,516,268	59,281	14.0	827,514	913,575
1893	738,741	19.2	14,168,955	7,651,236	48,858	13.6	664,310	783,886
1892	774,732	18.7	14,494,430	8,551,714	33,249	16.1	535,931	529,500
1891	752,453	24.4	18,323,459	11,690,367	41,451	18.6	769,600	816,546
1890	781,206	19.7	15,389,313	9,279,756	39,456	19.3	761,341	978,323
1889	708,068	19.1	13,509,237	7,524,645	21,830	17.0	371,893	471,188
1888	696,653	20.5	14,269,863	9,332,490	22,700	23.5	534,526	607,756
1887	726,756	16.8	12,173,332	6,804,892	20,275	13.6	275,975	270,180
Annual Averages:								
1932–1941	57,640	15.9	918,578	1,168,361	63,525	17.3	1,096,765	1,551,050
1922–1931	101,935	18.4	1,876,980	2,615,406	55,167	16.1	888,826	1,983,162
1912–1921	134,576	16.4	2,203,352	3,797,312	58,729	13.7	806,805	2,866,760
1902–1911	389,104	18.1	7,056,642	5,275,196	50,006	17.1	854,999	1,263,012
1882–1949	315,900	18.9	597,800	4,442,600	53,900	16.4	884,200	1,794,500

Rye and Buckwheat

The following table gives the area, production and farm value of Rye and Buckwheat for the years 1887 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Rye				Buckwheat			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
1949	106,000	21.0	2,226,000	2,960,000	72,200	20.9	1,509,000	1,766,000
1948	123,900	22.2	2,751,000	4,182,000	91,700	20.1	1,843,000	2,119,000
1947	74,800	19.3	1,444,000	3,697,000	173,500	18.4	3,192,000	3,543,000
1946	65,000	21.2	1,378,000	2,522,000	116,000	23.2	2,691,000	2,045,000
1945	67,500	18.5	1,249,000	1,187,000	152,000	19.9	3,025,000	2,329,000
1944	65,000	19.1	1,242,000	1,068,000	141,000	23.6	3,328,000	2,496,000
1943	64,000	16.5	1,056,000	908,000	159,000	22.5	3,578,000	2,648,000
1942	78,600	19.1	1,501,000	976,000	126,000	21.0	2,646,000	1,614,000
1941	73,700	17.0	1,253,000	827,000	116,300	20.0	2,326,000	1,349,000
1940	81,500	19.1	1,557,000	779,000	182,500	20.8	3,796,000	1,746,000
1939	75,652	18.2	1,378,000	799,000	168,404	21.2	3,570,000	1,856,000
1938	74,129	19.4	1,439,266	626,738	183,200	19.1	3,507,176	1,440,364
1937	74,704	17.3	1,291,222	1,006,882	195,193	19.2	3,753,901	2,237,761
1936	53,212	16.8	893,962	751,119	196,971	20.1	3,959,741	2,732,034
1935	59,340	17.6	1,044,363	417,797	186,427	20.9	3,896,451	1,558,406
1934	55,947	15.5	865,988	475,984	213,904	20.5	4,384,994	2,060,966
1933	54,006	16.9	913,024	465,739	207,124	21.0	4,349,266	1,826,807
1932	57,500	17.8	1,024,000	378,924	196,552	22.9	4,511,006	1,579,166
1931	61,701	17.9	1,104,754	462,594	178,719	20.5	3,665,584	1,551,607
1930	52,881	17.7	937,302	454,565	275,317	20.6	5,675,616	2,935,428
1929	52,023	16.8	873,239	847,938	294,388	18.9	5,562,013	4,627,121
1928	66,307	17.1	1,131,172	1,076,724	271,243	21.0	5,692,376	4,638,578
1927	72,323	17.8	1,289,058	1,228,421	249,210	23.6	5,892,510	4,593,204
1926	86,355	17.4	1,501,390	1,309,840	234,870	21.2	4,975,192	3,830,695
1925	98,652	18.1	1,784,625	1,553,529	257,932	21.6	5,579,109	4,086,236
1924	126,641	18.2	2,299,545	2,471,369	240,552	26.8	6,449,496	5,593,465
1923	123,354	16.3	2,011,325	1,481,691	230,276	21.8	5,012,010	3,670,511
1922	152,709	16.4	2,500,354	1,959,112	197,812	21.6	4,266,215	3,137,448
1921	122,868	14.5	1,775,599	1,467,086	147,944	22.7	3,354,201	2,482,999
1920	133,090	17.7	2,349,880	3,336,240	143,204	22.3	3,190,478	3,367,161
1919	140,072	15.8	2,219,042	3,531,031	178,569	22.8	4,071,959	5,727,413
1918	112,726	16.1	1,812,909	2,750,561	223,662	20.6	4,597,990	6,207,986
1917	133,077	16.7	2,222,325	3,614,591	153,457	19.5	2,992,391	4,278,256
1916	148,738	15.8	2,354,410	2,797,290	229,205	14.2	3,261,888	3,555,699
1915	173,736	18.5	3,210,512	2,532,051	193,497	22.1	4,278,366	3,057,398
1914	138,913	16.7	2,315,532	1,965,522	177,227	24.0	4,251,421	3,041,564
1913	118,429	16.7	1,979,775	1,310,306	228,279	17.6	4,012,418	2,549,398
1912	105,949	17.4	1,839,675	1,287,208	205,893	26.3	5,414,796	2,950,001
1911	98,652	15.8	1,562,971	1,326,510	189,039	20.4	3,852,231	2,324,992
1910	95,397	17.0	1,620,333	1,024,787	194,913	24.1	4,693,881	2,346,387
1909	94,661	16.6	1,573,921	1,060,566	176,630	24.2	4,280,790	2,284,440
1908	87,908	16.5	1,453,616	1,012,953	140,605	23.6	3,323,668	1,799,890
1907	67,158	15.5	1,039,021	721,081	113,039	22.5	2,546,468	1,461,673
1906	79,870	16.6	1,327,582	808,497	106,444	16.8	1,792,903	887,487
1905	101,292	16.9	1,714,951	974,092	101,591	21.7	2,199,652	1,099,826
1904	130,702	15.3	2,001,826	1,153,052	100,608	20.5	2,066,234	1,004,190
1903	179,277	16.6	2,970,768	1,443,793	95,487	21.5	2,049,169	907,782
1902	189,318	18.5	3,509,332	1,772,213	93,324	20.5	1,911,683	917,608
1901	158,236	16.1	2,545,268	1,254,817	88,266	19.9	1,757,071	850,422
1900	142,213	16.6	2,357,635	1,143,453	102,570	18.3	1,874,261	819,052
1899	137,824	16.6	2,284,846	1,142,423	132,082	16.7	2,203,299	1,002,501
1898	165,089	16.2	2,673,234	1,162,857	150,394	15.8	2,373,645	906,732
1897	187,785	18.0	3,382,005	1,275,016	151,669	22.8	3,464,186	1,039,256
1896	148,680	15.0	2,230,873	816,500	145,606	17.9	2,603,669	794,119
1895	120,350	15.8	1,900,117	866,453	135,262	20.6	2,791,749	1,027,364
1894	90,144	15.4	1,386,606	612,880	145,268	17.4	2,534,335	993,459
1893	68,486	14.5	994,771	472,516	133,828	17.8	2,380,456	995,031
1892	73,073	15.5	1,132,504	631,937	125,104	20.2	2,521,214	1,063,952
1891	67,865	16.7	1,134,630	820,337	107,879	24.2	2,608,142	1,150,191
1890	103,061	15.2	1.563,345	823,883	90,111	22.8	2,053,720	883,100
1889	90,106	15.9	1,431,679	728,725	56,398	22.6	1,272,578	502,668
1888	84,087	15.4	1,295,302	779,772	57,528	21.2	1,222,283	602,585
1887	68,362	13.1	894,887	442,969	64,143	16.0	1,025,353	461,409
Annual Averages:								
1932–1941	65,969	17.7	1,165,983	652,818	184,658	20.6	3,805,453	1,838,650
1922–1931	89,295	17.3	1,543,279	1,284,578	243,032	21.7	5,277,012	3,866,429
1912–1921	132,760	16.6	2,207,966	2,459,189	188,094	21.0	3,942,591	3,721,788
1902–1911	112,424	16.7	1,877,432	1,129,754	131,168	21.9	2,871,668	1,503,428
1882–1949	102,700	17.0	1,742,800	1,373,300	154,500	20.9	3,226,800	1,959,200

Flax and Mixed Grains

The folllowing table gives the area, production and farm value of Flax and Mixed Grains for the years 1907 to 1949, together with the annual averages for the various periods of ten years and the average for the 43 years 1907-1949.

Years	Flax				Mixed Grains			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
1949	16,500	11.9	196,000	647,000	1,211,000	35.3	42,748,000	39,328,000
1948	64,300	12.9	829,000	3,150,000	1,095,900	43.5	47,672,000	45,288,000
1947	56,200	12.0	674,000	3,653,000	751,100	33.7	25,312,000	23,793,000
1946	18,000	9.4	169,000	512,000	946,000	44.7	42,286,000	23,793,000
1945	23,200	9.9	230,000	564,000	943,000	35.8	33,477,000	20,756,000
1944	23,600	10.1	238,000	440,000	984,000	41.4	40,738,000	23,221,000
1943	24,000	9.8	235,200	435,000	895,000	22.8	20,406,000	11,835,000
1942	24,000	10.9	262,000	474,000	1,151,000	44.1	50,759,000	25,887,000
1941	11,800	9.6	113,000	175,000	1,176,500	33.1	38,942,000	19,860,000
1940	17,500	9.7	170,000	226,000	915,000	38.0	34,770,000	13,213,000
1939	6,162	9.3	58,000	92,000	914,364	39.0	35,662,000	14,621,000
1938	5,176	8.7	44,917	56,200	888,321	36.7	32,596,707	11,522,394
1937	5,009	10.3	51,743	72,501	890,136	34.5	30,674,828	14,787,597
1936	5,289	6.5	34,423	50,819	953,079	29.2	27,830,699	14,750,022
1935	7,436	10.2	75,277	98,277	926,557	36.5	33,821,188	11,499,206
1934	5,666	10.0	56,716	75,550	941,448	34.2	32,195,970	12,878,261
1933	5,548	9.0	49,474	59,357	946,779	29.1	27,552,147	10,470,240
1932	6,280	9.8	61,569	55,540	986,161	33.8	33,327,100	10,997,537
1931	7,325	10.9	79,555	83,812	1,012,347	34.7	35,155,615	12,510,754
1930	5,235	9.8	51,257	78,809	958,086	39.2	37,512,279	13,857,314
1929	5,492	8.5	46,927	109,034	892,897	33.5	29,903,638	21,890,640
1928	7,964	8.5	67,441	141,111	905,693	37.2	33,691,418	23,420,648
1927	7,080	9.6	68,173	121,004	799,333	39.9	31,918,944	22,882,169
1926	7,712	9.8	75,736	148,149	770,981	37.1	28,577,629	18,697,998
1925	9,789	12.6	123,134	262,386	681,624	41.4	28,246,057	16,559,729
1924	6,619	11.8	77,801	162,590	645,622	40.9	26,403,332	18,231,508
1923	6,766	10.2	68,684	140,376	648,934	36.8	23,880,889	14,290,315
1922	4,556	10.7	48,662	106,046	552,399	38.5	21,270,479	11,882,085
1921	7,534	8.9	66,748	130,995	618,289	26.2	16,188,510	10,579,352
1920	21,053	10.7	224,893	515,983	581,689	44.2	25,712,447	20,556,442
1919	13,717	9.4	129,461	670,608	628,761	31.4	19,735,287	26,403,773
1918	15,925	12.3	196,221	*1,224,783	619,389	44.3	27,462,374	28,253,556
1917	7,372	....	....	....	515,593	39.0	20,102,421	20,876,501
1916	5,880	....	....	....	485,986	27.4	13,297,354	12,485,065
1915	5,334	....	....	....	475,738	40.9	19,461,609	10,602,271
1914	6,025	....	....	....	456,631	36.9	16,854,550	10,074,678
1913	7,431	....	....	....	414,517	36.5	15,113,480	7,953,111
1912	9,125	....	....	....	448,402	36.5	16,382,161	8,674,724
1911	12,128	....	....	....	486,112	30.5	14,845,595	9,104,141
1910	12,021	....	....	....	497,936	36.7	18,261,803	9,187,822
1909	11,253	....	....	....	474,530	34.1	16,199,434	8,825,196
1908	8,562	....	....	....	456,049	33.7	15,354,350	8,444,893
1907	9,296	....	....	....	443,100	32.1	14,202,511	7,811,381
Annual Averages:								
1932–1941	7,587	9.4	71,512	96,124	953,834	34.3	32,737,264	13,459,926
1922–1931	6,854	10.3	70,737	135,332	786,792	37.7	29,666,028	17,422,316
1912–1921	9,940	....	....	....	524,500	36.3	19,031,019	15,645,948
1907–1911	10,652	....	....	....	471,545	33.4	15,772,739	8,674,687
1907–1949	12,800	....	....	....	767,200	36.3	27,825,900	16,879,700

*Including seed of the fibre variety commandeered and shipped to Ireland to the value of $930,769.

Husking Corn and Silo Corn

The following table gives the area, production and farm value of Corn for husking and for silo for the years 1893 to 1949, together with the annual averages for the various periods of ten years and the average for the fifty-eight years, 1892-1949.

Years	Corn for Husking				Corn for Fodder			
	Acres	Per acre	Bushels (shelled)	Farm value	Acres	Per acre	Tons (green)	Farm value
				$				$
1949	250,000	52.4	13,100,000	16,244,000	418,000	10.00	4,180,000	24,244,000
1948	242,400	50.0	12,120,000	15,998,000	401,600	9.95	3,996,000	21,099,000
1947	165,700	38.8	6,430,000	12,153,000	348,100	8.54	2,973,000	13,022,000
1946	240,000	43.3	10,392,000	11,016,000	340,000	8.97	3,050,000	10,980,000
1945	227,000	45.0	10,215,000	10,624,000	338,000	7.70	2,603,000	9,111,000
1944	240,000	46.0	11,040,000	10,930,000	327,000	10.14	3,316,000	11,606,000
1943	190,000	36.5	6,935,000	6,103,000	307,000	9.97	3,061,000	10,714,000
1942	258,000	52.8	13,622,000	10,898,000	300,000	10.45	3,135,000	10,847,000
1941	245,400	46.2	11,337,000	8,389,000	295,000	10.00	2,950,000	9,145,000
1940	186,000	37.4	6,956,000	3,826,000	339,00	9.18	3,112,000	7,500,000
1939	183,175	44.2	8,097,000	4,453,000	335,691	10.55	3,545,000	9,430,000
1938	180,130	42.7	7,696,212	3,307,900	321,754	10.79	3,470,225	8,726,715
1937	165,593	32.7	5,409,213	3,272,319	317,349	9.71	3,080,766	8,280,429
1936	164,399	37.0	6,082,942	4,136,165	306,934	8.05	2,470,816	7,858,238
1935	167,710	46.3	7,764,981	3,494,268	324,799	9.34	3,033,659	9,100,977
1934	161,137	42.2	6,797,863	4,419,012	323,173	9.25	2,990,000	11,960,000
1933	136,596	37.0	5,054,297	2,830,032	286,021	8.53	2,440,009	7,320,027
1932	130,257	38.8	5,056,623	2,275,625	285,343	9.02	2,573,977	6,434,943
1931	123,960	43.9	5,434,159	2,157,322	264,286	8.71	2,301,527	9,206,108
1930	130,094	39.6	5,148,898	3,569,682	311,817	8.40	2,619,049	10,476,196
1929	120,000	32.1	4,449,961	4,460,367	287,566	7.73	2,221,467	9,574,523
1928	110,192	41.9	4,614,567	4,714,511	299,307	8.97	2,685,727	11,199,482
1927	102,626	35.4	3,632,809	3,613,287	326,964	7.62	2,490,660	10,012,453
1926	179,325	38.4	6,886,293	5,529,069	367,772	9.51	3,497,071	15,736,820
1925	207,767	46.9	9,736,311	8,131,617	373,133	9.69	3,614,233	15,360,490
1924	263,615	42.3	11,141,331	11,737,059	403,060	9.87	3,977,017	17,896,577
1923	285,335	45.1	12,861,496	9,710,461	409,628	8.91	3,651,102	14,604,408
1922	265,018	46.5	12,306,242	8,609,503	438,819	10.06	4,413,191	17,652,764
1921	250,684	54.0	13,542,441	8,012,455	438,343	11.44	5,015,082	25,075,410
1920	243,909	52.9	12,914,851	12,867,119	449,176	10.39	4,668,054	23,340,270
1919	221,004	45.7	10,101,650	16,400,838	399,549	10.05	4,013,946	20,069,730
1918	195,310	44.4	8,676,715	13,650,415	380,946	10.35	3,944,313	17,749,409
1917	258,935	29.7	7,675,675	14,278,407	511,329	8.97	4,587,176	18,348,704
1916	258,332	32.8	8,478,048	9,446,060	439,411	7.46	3,276,185	10,647,610
1915	309,773	46.8	14,506,997	9,885,292	443,736	10.98	4,874,377	12,185,943
1914	290,817	53.3	15,488,240	10,622,455	418,105	11.36	4,751,223	11,878,058
1913	299,871	49.4	14,809,343	9,545,538	388,138	10.46	4,059,345	10,148,363
1912	301,251	48.6	14,646,312	8,162,565	377,982	10.50	3,969,597	9,923,993
1911	308,350	47.8	14,608,860	9,693,994	335,935	11.21	3,764,227	9,410,568
1910	320,519	51.8	16,600,257	9,301,245	326,627	11.60	3,788,364	7,576,728
1909	322,789	46.7	15,079,793	9,705,826	288,346	11.70	3,374,655	6,749,310
1908	299,690	52.5	15,734,081	9,440,336	233,753	11.68	2,729,265	5,458,530
1907	338,573	43.1	14,599,644	6,219,448	200,354	10.13	2,029,547	4,059,094
1906	289,456	55.3	15,992,455	9,019,744	180,796	11.89	2,149,413	4,298,826
1905	295,005	47.3	13,948,613	7,720,557	184,784	12.36	2,284,812	4,569,624
1904	329,882	40.9	13,494,609	7,570,476	193,115	10.48	2,023,340	4,046,680
1903	378,924	51.5	19,525,259	10,807,230	209,727	12.23	2,564,400	5,128,800
1902	371,959	36.7	13,674,796	8,327,951	209,859	12.44	2,611,334	5,222,668
1901	323,923	51.1	16,558,737	9,438,480	197,932	11.92	2,359,514	4,719,028
1900	330,772	54.6	18,062,374	8,588,659	179,798	11.94	2,147,532	4,295,064
1899	333,590	43.3	14,448,823	4,291,300	171,935	9.87	1,697,755	3,395,510
1898	330,748	47.3	15,628,395	4,711,961	189,948	11.20	2,128,073	4,256,146
1897	335,030	49.1	16,442,665	4,858,808	209,005	12.77	2,669,822	5,339,644
1896	317,667	50.5	16,047,576	4,717,987	178,962	10.89	1,948,780	3,897,560
1895	302,929	54.6	16,546,599	5,609,297	149,899	11.85	1,775,654	3,551,308
1894	267,348	40.6	10,850,235	4,247,867	111,361	9.43	1,049,765	2,099,530
1893	217,294	43.2	9,381,974	3,729,335	95,865	10.95	1,049,524	2,099,048
Annual Averages:								
1932–1941	172 040	40.8	7,025,213	4,040,332	313,506	9.46	2,966,645	8,575,633
1922–1931	178,793	42.6	7,621,207	6,223,288	348,235	9.04	3,147,104	13,171,982
1912–1921	262,989	45.9	12,084,027	11,287,114	424,672	10.16	4,315,930	15,936,749
1892–1949	243,900	45.7	11,135,700	7,765,900	303,300	10.00	3,029,400	10,009,200

Potatoes and Field Roots

The following table gives the area, production and farm value of Potatoes and Field Roots for the years 1887 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Potatoes				Field Roots			
	Acres	Per acre	Bushels	Farm value	Acres	Per acre	Bushels	Farm value
				$				$
1949	117,000	160.0	18,720,000	21,341,000	48,800	304	14,836,000	8,160,000
1948	115,300	176.7	20,370,000	24,077,000	51,900	376	19,514,000	8,586,000
1947	113,700	133.3	15,166,700	21,658,000	53,400	372	19,876,000	8,845,000
1946	120,000	150.0	18,000,000	19,980,000	61,500	408	25,092,000	7,779,000
1945	116,000	109.7	12,722,000	17,938,000	58,000	397	23,014,000	6,651,000
1944	120,000	118.2	14,180,000	15,082,000	59,000	443	26,126,000	6,086,000
1943	116,000	108.5	12,587,000	17,143,000	59,000	444	26,204,000	5,843,000
1942	122,000	97.8	11,935,000	12,174,000	57,700	440	25,388,000	4,569,000
1941	120,300	105.0	12,632,000	9,095,000	61,200	393	24,057,000	4,333,800
1940	146,800	76.7	11,255,000	7,496,000	98,300	438	43,056,000	5,167,000
1939	142,108	85.0	12,078,000	8,189,000	98,210	428	42,078,000	5,049,000
1938	146,177	84.7	12,380,000	5,779,073	99,080	420	41,605,213	4,992,626
1937	150,649	112.1	16,884,000	6,122,043	95,204	410	39,039,497	4,684,739
1936	145,046	100.0	14,500,000	11,744,902	94,310	384	36,168,232	5,027,553
1935	149,245	88.0	13,130,000	7,878,163	96,077	360	34,574,240	4,148,908
1934	164,325	120.0	19,716,000	6,506,762	98,100	400	39,195,238	5,485,934
1933	157,536	92.0	14,490,000	8,694,061	98,171	316	31,013,831	3,721,659
1932	156,252	101.5	15,860,000	6,565,765	97,749	391	38,237,844	3,059,026
1931	168,158	119.1	20,026,000	4,735,770	100,722	351	35,344,620	3,534,462
1930	159,192	114.8	18,275,000	10,906,175	103,188	349	36,013,133	7,202,627
1929	148,435	95.3	14,140,000	15,271,732	102,897	317	32,576,775	6,515,355
1928	181,241	103.7	18,792,000	11,052,928	105,358	466	49,061,855	9,812,371
1927	159,871	96.9	15,495,000	13,662,224	103,144	416	42,946,981	7,945,192
1926	153,468	107.5	16,496,000	18,627,771	105,509	348	36,752,497	7,350,500
1925	163,790	95.9	15,715,000	21,513,125	108,703	396	42,896,535	7,721,376
1924	169,145	147.6	24,967,000	13,355,441	106,068	454	48,163,735	8,187,835
1923	164,682	116.2	19,132,000	14,306,447	100,311	418	41,965,701	8,393,140
1922	172,858	117.7	20,350,000	10,385,525	102,909	450	46,289,881	9,257,977
1921	164,096	93.8	15,400,000	13,589,599	101,940	355	36,175,401	9,948,235
1920	157,509	152.1	23,962,000	23,776,530	117,038	490	57,315,696	15,761,817
1919	157,286	96.3	15,145,000	25,026,467	120,322	350	42,149,796	11,591,194
1918	166,203	116.6	19,376,000	19,238,431	126,163	479	60,434,835	15,108,709
1917	146,481	124.9	18,292,000	22,530,291	142,182	418	59,482,182	11,896,436
1916	139,523	50.5	7,408,000	9,684,215	134,463	252	33,823,714	4,735,320
1915	173,934	76.3	13,267,000	10,805,026	148,250	485	71,955,174	6,688,391
1914	167,591	159.4	26,718,000	11,747,332	146,034	492	71,776,228	6,668,833
1913	159,661	119.2	19,024,000	12,114,656	152,140	420	63,825,741	5,943,857
1912	158,888	134.3	21,346,000	13,604,052	161,632	478	77,232,680	7,169,846
1911	162,457	85.7	13,919,000	11,722,539	165,448	410	67,790,588	6,216,533
1910	168,454	130.2	21,928,000	10,798,597	177,326	474	84,111,609	7,717,438
1909	169,695	145.5	24,695,000	8,989,452	183,888	439	80,667,287	7,388,161
1908	166,974	110.9	18,518,000	8,874,201	188,857	376	71,081,155	6,510,696
1907	177,186	116.1	20,058,000	11,693,625	191,655	409	78,465,920	7,241,386
1906	136,064	110.4	15,020,000	8,080,921	201,864	445	89,923,343	8,335,070
1905	132,530	108.4	14,366,000	6,608,383	204,383	445	90,871,016	8,422,763
1904	133,819	115.7	15,479,000	7,847,915	204,551	481	98,457,143	9,173,805
1903	139,011	120.0	16,676,000	7,354,313	215,387	516	111,084,580	10,273,093
1902	144,733	89.4	12,942,000	7,312,514	213,278	520	110,881,128	10,305,294
1901	154,155	117.5	18,117,000	7,717,687	207,004	473	97,970,791	9,203,413
1900	163,754	131.1	21,476,000	5,605,351	211,126	398	84,058,920	7,911,322
1899	168,148	118.5	19,933,000	6,538,144	206,841	390	78,976,777	7,479,710
1898	169,946	84.5	14,359,000	6,332,154	199,524	434	86,685,446	8,229,393
1897	169,333	95.1	16,101,000	6,424,218	190,511	454	86,400,535	8,277,986
1896	178,965	119.0	21,305,000	5,582,035	184,335	470	86,664,242	8,329,436
1895	184,647	159.2	29,391,000	5,936,959	186,189	427	79,458,204	7,626,590
1894	167,253	102.6	17,163,000	6,075,748	175,327	418	73,226,614	7,092,019
1893	142,601	90.5	12,911,000	5,099,929	158,123	415	65,557,923	6,384,140
1892	145,703	84.3	12,290,000	6,194,068	151,653	487	73,892,115	7,182,202
1891	160,218	150.1	24,056,000	7,842,219	149,036	541	80,632,900	7,827,701
1890	158,094	111.1	17,561,000	7,779,575	137,008	430	58,635,081	5,631,617
1889	145,812	98.5	14,356,000	6,531,766	132,314	334	44,244,738	4,280,004
1888	153,915	144.7	22,274,000	7,060,733	....	....	....	....
1887	140,283	76.1	10,678,000	6,705,784	....	....	....	....
Annual Averages:								
1932–1941	147,844	96.7	14,293,000	7,807,077	93,640	394	36,902,500	4,567,000
1922–1931	164,084	112.4	18,439,000	13,381,714	103,900	397	41,201,200	7,592,100
1912–1921	159,117	113.1	17,994,000	16,211,660	135,000	425	57,417,100	9,551,300
1902–1911	153,092	113.4	17,355,000	8,928,246	194,700	454	88,433,400	8,158,400
1882–1949	152,600	113.3	17,293,200	11,121,400	129,900	424	55,083,400	7,099,600

Alfalfa and Hay and Clover

The following table gives the area, production and farm value of Alfalfa for the years 1912 to 1949, and of Hay and Clover for the years 1888 to 1949, together with the annual averages for the various periods of ten years and the average for the sixty-eight years, 1882-1949.

Years	Alfalfa				Hay and Clover			
	Acres	Per acre	Tons	Farm value	Acres	Per acre	Tons	Farm value
				$				$
1949	802,000	1.78	1,428,000	31,416,000	2,951,000	1.25	3,689,000	72,304,000
1948	732,200	2.49	1,823,000	29,168,000	3,026,500	1.90	5,750,000	82,800,000
1947	547,400	2.46	1,347,000	19,195,000	3,362,800	1.83	6,154,000	87,941,000
1946	707,500	2.26	1,599,000	18,916,000	2,952,000	1.76	5,196,900	55,606,000
1945	795,000	2.69	2,139,000	26,010,000	3,008,000	2.06	6,189,800	69,150,000
1944	789,000	2.58	2,036,000	22,844,000	2,924,700	1.62	4,735,900	48,548,000
1943	794,000	2.79	2,215,000	22,593,000	2,866,000	2.00	5,741,000	53,820,000
1942	763,000	2.74	2,091,000	20,220,000	2,707,500	1.93	5,222,000	45,383,000
1941	751,000	2.10	1,577,000	17,079,000	2,737,000	1.37	3,760,000	37,788,000
1940	715,000	2.65	1,895,000	13,511,000	2,699,400	1.86	5,021,000	31,733,000
1939	672,722	2.33	1,568,000	12,403,000	2,712,800	1.73	4,682,000	34,319,000
1938	643,075	2.38	1,527,824	11,076,733	2,769,600	1.73	4,793,200	32,081,000
1937	646,657	2.57	1,664,219	12,162,141	2,722,100	1.71	4,660,600	32,340,200
1936	666,374	2.28	1,519,010	13,276,250	2,898,300	1.60	4,637,300	38,301,700
1935	588,911	2.58	1,519,349	11,499,393	2,878,500	1.87	5,387,700	36,119,400
1934	510,215	1.83	934,035	12,559,686	2,970,400	1.13	3,352,500	40,606,000
1933	560,518	2.32	1,300,039	10,023,129	3,165,000	1.54	4,883,000	38,835,800
1932	527,793	2.66	1,403,923	11,527,009	3,194,000	1.65	5,269,500	36,625,800
1931	431,110	2.25	971,304	9,816,770	3,262,000	1.67	5,437,300	44,702,200
1930	641,686	2.20	1,409,528	16,065,846	3,329,400	1.58	5,263,400	52,740,200
1929	685,880	2.33	1,596,212	19,546,701	3,493,200	1.65	5,754,800	62,127,500
1928	743,230	2.33	1,730,135	20,020,248	3,380,400	1.66	5,615,500	59,551,200
1927	806,397	2.31	1,865,868	21,915,225	3,410,000	1.80	6,132,200	64,228,300
1926	748,473	2.47	1,850,392	25,889,781	3,383,700	1.55	5,238,600	63,594,231
1925	550,645	2.54	1,397,462	19,306,047	3,544,000	1.48	5,233,200	60,738,600
1924	381,258	2.80	1,067,717	12,252,536	3,545,856	1.58	5,615,238	61,283,373
1923	299,610	2.63	788,431	8,915,438	3,596,484	1.61	5,799,422	64,069,155
1922	221,326	2.84	629,135	7,439,403	3,575,662	1.56	5,568,459	66,964,036
1921	177,205	2.58	456,378	8,023,795	3,551,655	1.11	3,954,166	76,193,216
1920	162,820	2.45	399,581	10,172,434	3,533,740	1.26	4,459,094	109,036,159
1919	146,790	2.14	314,419	7,293,462	3,508,266	1.59	5,588,804	126,750,915
1918	144,010	2.28	328,971	6,579,420	3,470,036	1.32	4,596,854	83,344,591
1917	189,109	2.45	462,956	5,460,205	3,358,579	1.83	6,156,340	72,705,998
1916	177,565	2.60	460,788	4,822,622	3,294,419	2.05	6,739,259	71,503,879
1915	165,284	2.59	428,739	6,044,599	3,066,468	1.25	3,825,024	55,660,170
1914	163,685	2.28	372,759	5,195,667	3,251,799	1.07	3,469,795	50,721,713
1913	167,707	2.27	380,606	5,090,267	*3,261,139	1.09	3,543,957	46,212,298
1912	189,959	2.42	460,201	5,542,772	3,177,410	1.50	4,760,512	55,906,657
1911	....	....	....	....	3,301,468	1.28	4,238,362	55,767,671
1910	....	....	....	....	3,204,021	1.71	5,492,653	54,407,105
1909	....	....	....	....	3,228,445	1.20	3,885,145	49,754,078
1908	....	....	....	....	3,253,141	1.42	4,635,287	47,696,579
1907	....	....	....	....	3,289,552	1.18	3,891,863	58,806,050
1906	....	....	....	....	3,069,917	1.53	4,684,625	42,630,087
1905	....	....	....	....	3,020,365	1.94	5,847,494	45,142,654
1904	....	....	....	....	2,926,207	1.80	5,259,189	41,915,736
1903	....	....	....	....	2,783,565	1.56	4,336,562	34,432,302
1902	....	....	....	....	2,646,202	1.87	4,955,438	40,386,820
1901	....	....	....	....	2,557,263	1.81	4,632,317	37,012,213
1900	....	....	....	....	2,526,566	1.24	3,133,045	26,568,222
1899	....	....	....	....	2,505,422	1.40	3,498,705	27,010,003
1898	....	....	....	....	2,453,503	1.79	4,399,063	27,362,172
1897	....	....	....	....	2,341,488	1.63	3,811,518	27,366,699
1896	....	....	....	....	2,426,711	.93	2,260,240	21,879,123
1895	....	....	....	....	2,537,674	.73	1,849,914	22,753,942
1894	....	....	....	....	2,576,943	1.39	3,575,200	27,028,512
1893	....	....	....	....	2,766,894	1.79	4,963,557	37,921,575
1892	....	....	....	....	2,515,367	1.74	4,384,838	35,955,672
1891	....	....	....	....	2,549,975	.94	2,392,798	28,498,224
1890	....	....	....	....	2,462,002	1.75	4,305,915	34,232,024
1889	....	....	....	....	2,386,223	1.56	3,728,313	37,208,564
1888	....	....	....	....	2,292,638	.88	2,009,017	33,570,674
Annual Averages								
1932–1941	628,227	2.37	1,490,840	12,511,734	2,536,019	1.57	3,996,732	32,196,216
1922–1931	550,962	2.42	1,330,618	16,116,800	3,141,888	1.57	4,469,462	54,824,511
1912–1921	168,413	2.41	406,540	6,422,524	3,347,351	1.41	4,709,381	74,803,560
1902–1911	....	....	....	....	*3,072,288	1.54	4,722,662	47,093,908
1882–1949	‡478,300	2.41	1,151,500	13,305,200	2,809,600	1.51	4,251,500	46,737,100

*Including Alfalfa ‡1912-1949

Field Crops

The following table gives the area, production and farm value of all Field Crops for the years 1890 to 1949, together with the annual averages for the various periods of ten years and the average for the whole period.

Years	All Field Crops†		
	Total acres	Per acre	Total Value
		$ c.	$
1949	9,380,600	36.17	339,310,000
1948	9,120,200	41.24	376,084,000
1947	8,095,200	34.09	275,928,600
1946	8,248,400	27.69	228,391,000
1945	8,427,500	27.23	229,472,000
1944	8,587,900	25.20	216,442,000
1943	7,995,800	21.92	175,283,000
1942	8,801,800	22.90	201,545,000
1941	8,657,500	18.59	160,984,800
1940	9,118,600	15.17	138,374,000
1939	9,085,758	16.54	150,288,000
1938	9,088,014	13.88	126,158,324
1937	9,043,201	16.61	150,203,348
1936	9,119,007	17.80	162,333,522
1935	9,106,295	14.41	131,260,274
1934	8,999,999	15.96	143,755,962
1933	9,194,940	13.57	124,679,714
1932	9,225,680	12.37	114,150,521
1931	9,176,062	13.65	125,219,586
1930	10,009,097	17.33	173,498,548
1929	10,020,294	23.62	236,651,277
1928	10,357,960	23.60	244,445,136
1927	10,305,045	24.90	256,627,042
1926	10,434,401	24.70	257,686,886
1925	10,364,317	25.23	261,490,292
1924	10,264,614	25.76	264,370,642
1923	10,296,961	21.28	219,114,500
1922	10,258,613	21.77	223,342,150
1921	10,075,073	22.05	222,177,881
1920	10,108,272	36.37	367,608,619
1919	9,915,884	40.06	397,238,400
1918	9,992,825	36.42	363,909,778
1917	9,718,259	34.30	333,353,438
1916	9,548,876	23.43	223,748,948
1915	9,762,951	21.58	210,674,415
1914	9,621,444	20.70	199,152,945
1913	9,541,537	17.65	168,455,253
1912	9,574,474	19.40	185,790,341
1911	9,718,741	18.52	179,974,358
1910	9,725,684	18.01	175,115,742
1909	9,578,323	17.54	167,966,577
1908	9,621,683	17.05	164,077,282
1907	9,750,615	18.09	176,354,759
1906	8,962,925	16.13	144,570,075
1905	8,897,898	16.05	142,804,431
1904	8,673,525	15.48	134,304,690
1903	8,731,405	15.65	136,657,807
1902	8,677,988	16.87	146,421,171
1901	8,667,512	14.81	128,325,648
1900	8,794,953	13.05	114,758,761
1899	8,753,926	12.08	105,771,321
1898	8,835,272	12.51	110,528,947
1897	8,701,705	12.29	106,952,471
1896	8,511,444	10.44	88,900,135
1895	8,321,173	11.98	99,655,895
1894	8,227,153	11.43	94,055,392
1893	8,054,612	12.65	101,886,557
1892	8,080,206	13.68	110,562,493
1891	7,834,213	16.70	130,866,023
1890	7,912,297	14.46	114,382,305
Annual Averages:			
1932–1941	9,063,899	15.47	140,218,846
1922–1931	10,148,736	22.19	225,244,606
1912–1921	*9,785,960	27.31	*267,211,002
1902–1911	9,233,879	16.98	156,824,689
1882–1949	8,986,700	19.89	178,749,100

*Including Flax, 1918-1921. †Not including sugar beets.

No Statistics of "mixed grains" were taken previous to 1907, when an acreage of 443,100

The following table gives the area in Cleared Pasture for the years 1909 to 1949.

Years	Pasture (cleared)	Years	Pasture (cleared)
	Acres		Acres
1949	2,756,400	1928	3,000,172
1948	*2,829,100	1927	3,012,786
1947	3,447,900	1926	3,077,424
1946	3,209,000	1925	3,193,941
1945	3,135,000	1924	3,317,532
1944	2,939,000	1923	3,472,642
1943	2,915,000	1922	3,401,033
1942	2,717,000	1921	3,401,998
1941	2,701,000	1920	3,432,620
1940	2,712,000	1919	3,499,802
1939	2,749,462	1918	3,561,754
1938	2,793,291	1917	3,509,945
1937	2,782,811	1916	3,409,581
1936	2,828,310	1915	3,350,420
1935	2,831,416	1914	3,302,503
1934	2,908,275	1913	3,120,146
1933	2,995,468	1912	3,082,671
1932	3,012,529	1911	3,116,768
1931	3,039,026	1910	3,159,712
1930	3,149,460	1909	3,180,780
1929	3,134,614		

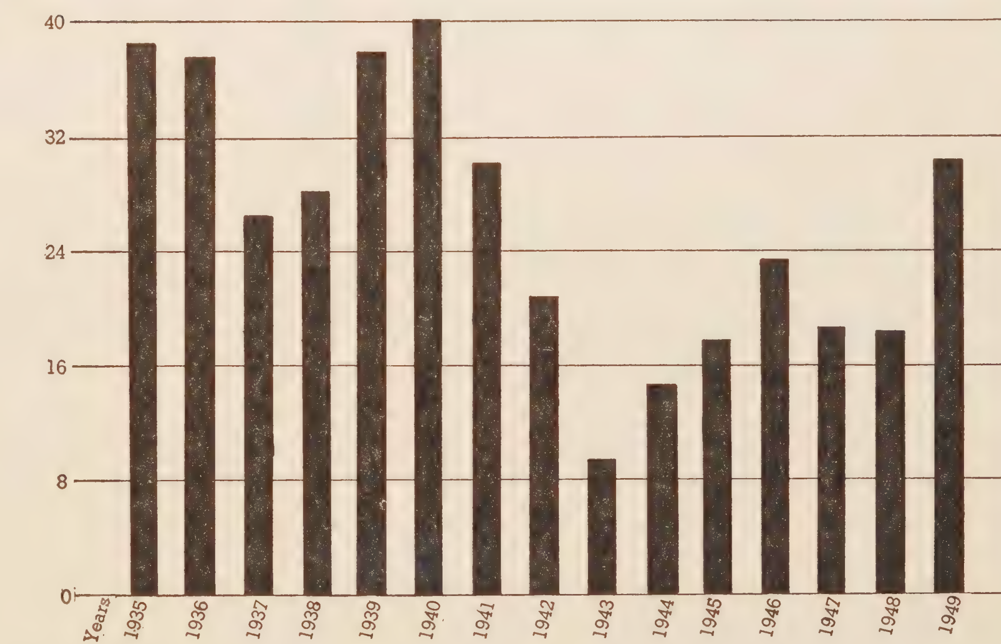
*Acreage of seeded pasture.

Sugar Beets and Soy Beans

The following table gives the area, production and farm value of Soy Beans for the years 1943 to 1949, and the area, production and farm value of Sugar beets for the years, 1930 to 1949. An Annual average for a ten-year period and an average for the twenty years 1930-1949 is included.

Years	Sugar Beets				Soy Beans			
	Acres	Per Acre	Tons	Farm Value	Acres	Per acre	Bushels	Farm Value
				$				$
1949	30,000	11.18	335,400	4,630,000	103,800	25.1	2,605,000	5,887,000
1948	18,400	10.70	197,000	2,817,000	94,000	19.4	1,824,000	4,195,000
1947	18,600	8.83	164,300	2,251,000	61,000	18.2	1,110,000	3,397,000
1946	23,300	9.97	232,400	3,184,000	59,200	18.1	1,072,000	2,370,000
1945	17,700	9.27	164,200	1,915,000	46,000	18.3	842,000	1,600,000
1944	14,500	9.03	131,000	1,629,000	44,700	18.9	845,000	1,690,000
1943	9,300	6.96	64,700	757,000	47,000	18.6	874,000	1,573,000
1942	20,700	12.00	250,000	1,788,000	41,490	....	....	....
1941	30,100	10.70	322,200	2,104,000	10,900	....	....	....
1940	40,100	9.83	394,000	2,589,000	10,600	....	....	....
1939	38,000	8.53	324,000	2,472,000	9,786	....	....	....
1938	28,200	9.79	276,000	1,794,000	9,250	....	....	....
1937	26,500	6.98	185,000	990,000	8,602	....	....	....
1936	37,600	10.30	391,000	2,080,000	11,272	....	....	....
1935	38,500	8.49	327,000	1,736,000	9,274	....	....	....
1934	37,600	6.80	255,700	1,450,000	11,739	....	....	....
1933	31,900	10.00	319,000	1,994,000	10,792	....	....	....
1932	33,300	10.00	330,000	1,733,000	7,781	....	....	....
1931	38,000	9.31	354,000	2,124,000	....	....	....	....
1930	38,000	8.94	340,000	2,380,000	....	....	....	....
Annual Averages:								
1943–1949	....	....	....	....	65,100	20.1	1,310,300	2,958,900
1940–1949	22,300	10.11	225,500	2,366,400	....	....	....	....
1930–1949	28,500	9.40	267,900	2,120,900	....	....	....	....

ACREAGE OF SUGAR BEETS IN ONTARIO
ANNUALLY 1935-1949.



Acreage of Sugar Beets,
By County, Year 1949

Elgin	260
Essex	810
Huron	1,300
Kent	17,920
Lambton	5,190
Middlesex	4,040
Oxford	10
Perth	470
TOTAL	30,000

Ratios of Area under Crop

The following table shows the number of acres under the various crops per 1,000 acres of cleared land for the years 1889 to 1949, together with the annual averages for the various periods of ten years and for the term of years 1882-1949.

Year	Fall Wheat	Spring Wheat	Barley	Oats	Peas, Dry	Beans, Dry	Rye	Buckwheat	Corn	Potatoes	*Roots	Hay and Clover	Mixed Grains
1949	52.9	3.9	13.7	149.9	1.7	5.1	7.0	4.7	43.9	7.7	3.2	194.1	79.6
1948	55.8	3.4	14.7	119.3	1.9	5.1	8.1	6.0	41.9	7.5	3.4	196.7	71.2
1947	46.5	2.0	14.9	84.2	2.8	5.5	4.9	11.3	33 6	7.4	3.5	209.2	49.1
1946	35.9	2.5	19.2	107.3	2.3	5.0	4.3	7.6	38.1	7.9	4.0	179.9	62.1
1945	44.5	2.4	20.1	100.4	2.3	5.4	4.5	10.0	37.3	7.7	3.8	182.3	62.2
1944	44.1	2.5	21.8	113.2	2.3	5.4	4.3	9.3	37.4	7.9	3.9	177.3	64.9
1943	39.6	2.5	18.4	96.1	2.1	4.5	4.2	10.5	32.8	7.7	3.8	173.1	59.0
1942	49.7	2.8	23.2	129.1	2.2	4.1	5.2	8.3	36.6	8.0	3.8	163.4	75.6
1941	37.3	3.0	24.0	129.6	2.4	6.2	4.9	7.7	35.6	7.9	4.0	161.4	76 7
1940	50.8	4.5	32.7	147.6	3.6	5.6	5.3	11.9	34.4	9.6	6 4	156.4	59 9
1939	48.2	5.4	34.3	149.2	3.4	4.1	5.0	11.0	34.0	9.3	9.1	157.5	60 0
1938	48.4	5.7	35.5	147.7	3.4	3.9	4.8	12.0	32.8	9.5	8.3	159 3	58 0
1937	46.9	6.1	36.3	147.8	3.8	3.7	4.9	12.7	31.5	9.8	8.3	161.5	58.1
1936	33.5	6.4	34.1	154.2	4.4	3.7	3.5	12.9	31.0	9.5	8.8	165.0	62.6
1935	36.5	6.5	34.4	156.2	4.5	3.7	3.9	12.3	32.4	9.8	9.1	166.2	60.9
1934	28.0	6.4	32.0	157.5	4.5	3.3	3.7	14.1	31.9	10.8	9.1	172.6	62.7
1933	36.8	6.4	30.4	152.4	3.9	3.4	3.6	13.6	27.8	10.4	8.7	182.3	62.1
1932	35.3	6.6	30.1	154.1	3.9	4.1	3.8	13.0	27.4	10.3	8.8	183.2	65.0
1931	34.6	6.5	28.8	153.5	3.9	5.0	4.1	11.8	25.6	11.1	9.2	188.3	66 3
1930	44.6	6.5	40.2	162.6	5.3	4.4	3.5	18.1	29.1	10.5	9.4	187.7	63 0
1929	45.6	7.0	41.0	154.0	5.2	4.2	3.4	19.4	26.9	9.8	9.3	192.2	58.9
1928	45.8	7.2	40.6	175.5	7.3	3.4	4.4	17.9	27.0	12.0	10.1	185.5	59.8
1927	49.6	7.9	34.0	177.7	7.0	3.1	4.8	16.5	28.4	10.6	9.5	187.1	52.8
1926	53.4	7.6	29.7	187.3	6.5	3.4	5.7	15.5	36.2	10.2	9.8	191.1	51.0
1925	49.5	7.5	28.9	187.9	8.8	4.0	6.5	17.1	38.5	10.8	9.8	234.7	45.1
1924	47.9	6.7	29.1	191.7	8.7	3.5	8.4	15.9	44.2	11.2	9.6	235.1	42.8
1923	47.6	7.4	30.1	197.1	7.8	2.7	8.2	15.3	46.2	10.9	8.3	238.9	43.1
1922	54.2	8.3	28.9	202.1	7.0	2.7	10.2	13.2	46.9	11.5	8.4	238.1	36.8
1921	41.4	10.2	30.8	206.1	7.1	1.8	8.2	9.9	45.9	10.9	8.8	236.5	41.2
1920	51.0	17.9	32.4	192.5	7.3	1.5	8.9	9.6	46.3	10.5	10.4	247.1	38.9
1919	41.6	24.2	38.2	179.5	8.5	1.5	9.4	12.0	41.7	10.6	9.9	245.3	42.2
1918	24.5	23.8	44.6	197.6	7.7	6.8	7.6	15.1	38.9	11.2	10.3	244.2	41.9
1917	39.8	12.4	37.4	187.6	6.1	7.5	9.0	10.4	52.3	10.0	11.4	240.9	35.0
1916	47.9	9.8	35.9	183.0	6.5	3.7	10.1	15.6	47.5	9.5	10.8	236.2	33.1
1915	55.5	11.1	37.8	196.4	8.7	4.3	11.9	13.2	51.5	11.9	11.9	221.0	32.5
1914	47.0	8.1	39.7	190.2	12.2	3.5	9.5	12.1	48.6	11.5	11.5	234.0	31.3
1913	44.5	8.0	43.0	186.0	12.2	4.6	8.2	15.7	47.4	11.0	12.0	236.2	28.5
1912	52.6	8.5	44.8	180.1	15.3	4.8	7.4	14.3	47.0	11.0	12.8	233.1	31 0
1911	58.2	9.3	42.9	187.7	21.2	3.6	6.9	13.1	44.8	11.3	13.4	229.6	33.8
1910	51.9	9.0	43.7	192.5	28.2	3.5	6.6	13.6	45.2	11.8	14.5	223.7	34.8
1909	46.5	9.5	48.8	189.0	26.7	3.2	6.6	12.4	42.9	11.9	14.5	226.5	33.3
1908	48.1	10.1	51.9	196.3	28.1	3.3	6.2	9.9	37.7	11.8	14.9	230.2	32.3
1907	47.9	10.2	54.3	207.7	24.1	3.4	4.8	8.0	38.2	12.6	15.1	233.0	31.4
1906	55.8	12.2	53.6	192.6	29.1	3.6	5.7	7.5	33.3	9.7	14.7	217.6	.....
1905	57.2	13.6	55.5	191.5	26.9	3.6	7.3	7.3	34.4	9.5	15.1	216.8	.....
1904	43.8	16.3	55.9	192.2	24.6	3.7	9.5	7.3	37.9	9.7	15.3	211.9	.....
1903	48.8	18.2	52.0	193.4	29.9	3.9	13.1	7.0	43.2	10.2	16.4	204.0	.....
1902	55.2	22.3	48.8	184.3	39.2	4.0	13.9	6.9	42.9	10.7	16.3	195.0	.....
1901	67.8	26.6	47.4	179.3	44.9	4.0	11.8	6.6	38.8	11.5	16.1	190.3	.....
1900	80.4	28.3	43.4	180.4	49.8	3.3	10.7	7.7	38.4	12.3	16.7	190.0	.....
1899	80.1	30.4	37.4	180.3	56.7	3.1	10.5	10.1	38.6	12.8	16.6	191.1	.....
1898	80.7	30.0	33.8	182.9	66.6	3.4	12.7	11.5	40.1	13.1	16.4	188.8	.....
1897	73.9	25.2	35.1	189.3	69.8	3.9	14.6	11.8	42.3	13.2	15.7	182.2	.....
1896	69.2	20.2	36.5	191.4	65.5	5.4	11.7	11.5	39.2	14.1	15.4	191.5	.....
1895	59.8	18.0	38.5	191.0	64.4	5.8	9.7	10.9	36.4	14.9	16.0	204.2	.....
1894	63.4	18.7	39.6	190.6	63.9	4.8	7.3	11.8	30.8	13.6	15.2	209.6	.....
1893	75.5	29.4	38.6	159.9	61.0	4.0	5.6	11.0	25.9	11.8	13.9	228.4	.....
1892	80.6	54.3	41.7	155.3	64.6	2.8	6.1	10.4	22.8	12.2	13.4	209.8	.....
1891	72.0	43.3	46.9	156.0	63.8	3.5	5.7	9.1	20.4	13.6	13.4	216.1	.....
1890	61.8	51.6	60.2	161.5	67.0	3.4	8.8	7.7	19.2	13.6	12.7	211.2	.....
1889	71.6	34.7	76.3	167.6	61.7	1.9	7.9	4.9	16.3	12.7	12.5	208.0	.....
Annual Averages:													
1932–1941	40.2	5.7	32.4	149.6	3.8	4.2	4.3	12.1	31.9	9.7	6.1	166.5	62.6
1922–1931	47.3	7.3	33.1	178.9	6.7	3.6	5.9	16.1	34.9	10.9	9.3	207.8	52.0
1912–1921	44.5	13.4	38.4	189.9	9.1	4.0	9.0	12.9	46.6	10.0	11.0	237.5	35.6
1902–1911	51.3	13.0	50.7	192.8	27.7	3.6	8 0	9.4	40.1	10.9	15.8	219.0	†33.1
1882–1949	53.5	16.1	39.3	167.3	22.6	3.8	7.3	11 0	40.0	11.0	9.2	200.7	‡54.5

*Mangels and turnips. †1907–1911. ‡1907–1949.

Market Prices

The following table gives the average Market Prices of Agricultural Products for the years 1889 to 1949, together with the annual averages for the various periods of ten years and for the whole term of years, 1882-1949.

Years	Fall Wheat per bush.	Spring Wheat per bush.	Oats per bush.	Barley per bush.	Peas per bush.	Beans per bush.	Rye per bush.	Buckwheat per bush.	Corn (shelled) per bush.	Hay per ton	Potatoes per cwt.
	cents	cents	cents	cents	cents	$ c.	cents	cents	cents	$ c.	cents
1949	172.9	172.9	77.9	117.0	247.1	3.32	133.0	117.0	124.0	19.60	114.0
1948	207.0	207.0	69.8	110.0	286.0	4.11	152.0	117.0	132.0	14.08	175.0
1947	149.0	149.0	83.0	105.0	300.0	5.47	247.1	111.0	219.0	14.05	133.8
1946	123.0	122.0	54.0	72.0	284.0	2.97	183.0	76.0	106.0	10.86	185.0
1945	108.0	108.0	56.0	71.0	300.0	2.50	95.0	77.0	104.0	11.28	235.0
1944	109.0	108.0	55.0	68.0	275.0	2.50	86.0	75.0	99.0	10.57	177.3
1943	107.0	106.0	55.0	66.0	206.0	2.15	86.0	74.0	88.0	9.37	227.0
1942	88.0	88.0	44.0	57.0	199.0	1.50	65.0	61.0	80.0	8.89	170.0
1941	94.0	90.0	44.0	56.0	187.0	1.65	66.0	58.0	74.0	10.48	120.0
1940	63.0	65.0	32.0	44.0	187.0	1.75	50.0	46.0	55.0	6.5[illegible]	111.0
1939	64.0	66.0	34.0	46.0	177.0	2.25	58.0	52.0	55.0	7.61	113.4
1938	56.0	58.0	27.9	40.8	150.0	1.00	43.5	41.1	43.0	6.92	77.0
1937	103.9	102.4	42.1	58.5	156.0	1.07	78.0	59.6	60.5	7.14	60.0
1936	109.0	108.0	48.0	80.0	155.0	2.02	84.0	69.0	68.0	8.79	135.8
1935	71.0	73.0	28.0	40.0	95.0	1.45	40.0	40.0	45.0	7.08	100.0
1934	88.0	85.0	35.0	50.0	85.0	1.27	55.0	47.0	65.0	12.62	55.0
1933	66.0	67.0	33.0	41.0	80.0	.92	51.0	42.0	56.0	8.41	100.0
1932	46.0	45.0	25.0	36.0	65.0	.49	37.0	35.0	45.0	7.24	69.0
1931	51.6	50.9	25.0	36.5	62.6	.58	41.9	42.3	39.8	8.43	39.3
1930	66.3	65.5	29.7	35.9	104.8	1.44	48.5	51.7	69.3	10.42	99.5
1929	124.0	125.2	62.4	76.5	163.0	3.03	97.1	83.2	100.2	11.28	180.0
1928	122.0	119.2	55.5	74.2	152.8	3.83	95.2	81.5	102.2	11.23	93.0
1927	124.7	122.1	57.3	77.6	149.8	2.35	95.3	77.9	99.5	11.02	147.0
1926	125.1	125.1	51.8	68.0	150.6	2.34	87.2	77.0	80.3	12.75	188.2
1925	133.6	133.0	45.2	68.1	135.5	2.11	87.1	73.2	88.6	11.61	228.2
1924	133.9	137.0	54.2	82.2	151.1	2.29	107.5	86.7	105.3	10.91	89.2
1923	96.2	96.3	45.4	62.8	144.8	2.43	73.7	73.2	75.5	11.05	124.7
1922	104.6	105.1	43.5	61.3	140.3	2.54	78.4	73.5	69.9	12.03	85.0
1921	110.5	109.4	50.4	65.7	153.0	2.35	82.6	74.0	59.1	19.27	147.0
1920	193.4	183.8	58.2	93.8	193.3	2.88	142.0	105.5	99.6	24.25	165.3
1919	237.2	240.9	97.7	145.8	263.9	4.00	159.1	140.7	162.3	22.68	275.3
1918	210.9	208.6	75.0	103.6	217.7	4.49	151.7	135.0	157.4	18.13	165.5
1917	209.8	209.7	77.9	125.7	321.0	6.91	162.6	142.9	186.0	11.81	205.3
1916	161.3	162.2	66.0	101.9	210.5	5.46	118.8	109.0	111.5	10.60	216.8
1915	97.1	98.6	39.5	56.0	161.6	3.11	78.9	71.5	68.1	14.51	135.7
1914	109.1	107.9	49.5	64.3	136.6	2.14	84.9	71.5	68.6	14.55	73.3
1913	85.0	87.9	36.9	55.5	100.6	1.70	66.2	63.5	64.5	13.07	106.2
1912	91.7	90.0	38.6	58.7	110.3	1.93	70.0	54.5	55.8	11.77	106.2
1911	86.6	90.7	44.2	73.9	98.2	1.90	84.9	60.4	66.3	13.16	140.3
1910	86.6	89.6	35.0	52.0	80.7	1.55	63.2	50.0	56.0	9.91	82.0
1909	102.3	100.6	39.5	54.8	84.6	1.61	67.4	53.4	64.4	12.81	60.8
1908	89.2	90.8	40.3	52.4	82.7	1.48	69.7	54.2	60.0	10.25	79.8
1907	92.7	86.4	48.8	59.4	78.0	1.52	69.4	57.4	42.6	15.11	97.2
1906	70.7	68.9	34.0	45.0	70.6	1.39	60.9	49.5	56.4	9.10	89.7
1905	76.5	74.9	33.6	42.9	65.3	1.32	56.8	50.0	55.4	7.72	76.7
1904	98.7	94.2	32.3	43.7	63.0	1.22	57.6	48.6	56.1	7.97	84.5
1903	75.1	74.4	29.3	42.1	64.3	1.41	48.6	44.3	55.4	7.94	73.5
1902	70.7	69.6	34.8	45.1	71.0	1.35	50.5	48.0	60.9	8.15	94.3
1901	66.1	66.8	36.2	45.0	65.3	1.25	49.3	48.4	57.0	7.99	71.0
1900	66.4	67.5	26.5	38.9	57.1	1.00	48.5	43.7	47.6	8.48	43.5
1899	66.7	66.5	27.7	39.5	57.3	1.08	50.0	45.5	29.7	7.72	54.7
1898	69.4	69.2	25.8	38.0	52.2	.70	43.5	38.2	30.2	6.22	73.5
1897	78.2	78.6	22.6	27.0	42.1	.65	37.7	30.0	29.6	7.18	66.5
1896	71.0	70.6	20.0	31.6	44.0	.68	36.6	30.5	29.4	9.68	43.5
1895	69.3	69.8	29.1	40.4	54.8	.95	45.6	36.8	33.9	12.30	33.7
1894	55.0	55.5	30.8	40.5	53.6	1.10	44.2	39.2	39.2	7.56	59.0
1893	59.9	59.4	33.2	40.1	54.0	1.18	47.5	41.8	39.8	7.64	65.8
1892	70.7	67.8	30.8	41.3	59.0	.99	55.8	42.2	39.5	8.20	84.0
1891	95.1	92.9	36.5	49.1	63.8	1.06	72.3	44.1	46.7	11.91	54.3
1890	94.2	91.3	41.1	50.2	60.3	1.29	52.7	43.0	45.8	7.95	74.0
1889	88.4	88.1	30.5	44.0	55.7	1.27	50.9	39.5	38.9	9.98	75.8
Annual Averages											
1932–1941	74.0	75.1	34.4	48.9	127.2	1.41	56.0	48.3	57.5	8.06	91.0
1922–1931	110.6	108.5	47.1	64.2	139.3	2.23	83.2	73.3	81.6	11.08	121.0
1912–1921	144.5	171.6	58.5	86.0	172.3	2.35	111.4	94.4	93.5	15.88	150.2
1902–1911	83.6	81.2	36.7	50.1	74.8	1.48	60.2	52.4	57.3	9.97	85.7
1882–1949	97.6	98.2	42.7	60.4	77.0	1.97	77.1	65.3	*68.8	10.89	102.7

Number of Live Stock on Hand

The following table gives the number of Horses, Cattle, Sheep, Swine and Poultry on hand in June of each year for the sixty-six years, 1884-1949.

Years	Horses	Cattle	Sheep	Swine	Poultry
	No.	No.	No.	No.	No.
1949	401,500	2,860,400	511,800	2,193,100	24,720,000
1948	423,000	2,869,600	571,600	1,768,800	25,395,000
1947	451,200	2,875,000	667,500	2,244,700	30,626,000
1946	466,710	2,868,500	701,080	2,013,300	29,772,000
1945	491,287	2,893,819	724,257	1,979,000	28,648,330
1944	506,607	2,744,810	736,783	1,900,000	27,467,483
1943	522,187	2,692,672	737,486	1,885,600	26,692,812
1942	526,976	2,639,212	688,904	1,861,298	24,621,791
1941	533,742	2,641,046	661,900	1,922,357	23,092,833
1940	559,863	2,518,350	694,600	1,997,957	22,901,148
1939	559,468	2,488,041	735,500	1,546,095	22,841,667
1938	560,711	2,492,258	762,000	1,430,309	22,420,047
1937	557,845	2,453,081	793,000	1,457,886	22,536,141
1936	562,916	2,474,194	819,100	1,408,308	22,958,383
1935	562,877	2,469,231	889,700	1,225,310	22,961,834
1934	563,657	2,494,471	920,500	1,177,913	22,802,578
1933	567,093	2,522,180	972,900	1,257,870	22,991,456
1932	578,615	2,528,615	1,025,400	1,375,115	22,929,143
1931	578,157	2,509,205	1,044,600	1,359,176	23,736,125
1930	606,719	2,675,488	1,134,457	1,661,556	22,560,260
1929	606,505	2,671,594	1,130,395	1,681,263	22,045,091
1928	609,249	2,682,053	1,014,106	1,833,538	19,703,576
1927	617,136	2,709,954	956,267	1,883,177	19,048,045
1926	629,659	2,757,799	886,483	1,735,355	17,693,000
1925	644,138	2,809,373	868,526	1,678,595	17,778,581
1924	663,875	2,917,302	870,279	1,807,903	16,751,345
1923	673,371	2,838,087	907,673	1,734,734	15,203,384
1922	685,852	2,836,181	986,617	1,553,434	13,964,317
1921	694,237	2,890,113	1,081,828	1,563,807	11,458,206
1920	704,640	2,881,827	1,129,084	1,614,356	11,005,645
1919	719,569	2,927,191	1,101,740	1,695,487	11,705,809
1918	732,977	2,867,722	972,341	1,656,386	12,281,105
1917	765,873	2,827,609	956,986	1,664,639	13,606,292
1916	775,732	2,734,767	908,066	1,735,254	14,377,844
1915	779,131	2,674,746	908,095	1,769,295	14,273,091
1914	774,544	2,604,628	922,375	1,770,533	14,175,214
1913	751,726	2,628,845	996,155	1,618,734	13,511,383
1912	742,139	2,624,780	1,021,848	1,702,652	13,024,938
1911	737,916	2,593,205	1,040,245	1,744,983	12,942,293
1910	724,384	2,567,128	1,065,101	1,561,042	12,460,787
1909	728,308	2,668,584	1,130,667	1,551,187	12,086,580
1908	726,471	2,824,859	1,143,898	1,818,763	12,285,613
1907	725,666	2,926,236	1,106,083	2,049,666	13,428,076
1906	688,147	2,963,618	1,304,809	1,819,778	10,254,824
1905	672,781	2,889,503	1,324,153	1,906,460	9,738,493
1904	655,554	2,776,304	1,455,482	2,008,984	9,412,683
1903	639,581	2,674,261	1,642,627	1,977,386	9,683,573
1902	626,106	2,562,584	1,715,513	1,684,635	9,762,808
1901	620,343	2,507,620	1,761,799	1,491,885	9,745,236
1900	617,309	2,429,330	1,797,213	1,771,641	9,541,241
1899	615,524	2,318,355	1,772,604	1,971,070	9,344,024
1898	611,241	2,215,943	1,677,014	1,640,787	9,084,273
1897	813,670	2,182,326	1,690,350	1,284,963	8,435,341
1896	624,749	2,181,958	1,849,348	1,269,631	7,734,167
1895	647,696	2,150,103	2,022,735	1,299,072	7,752,840
1894	674,777	2,099,301	2,015,805	1,142,133	7,552,662
1893	685,187	2,057,882	1,935,938	1,012,022	7,114,436
1892	688,814	2,029,140	1,850,473	996,974	7,078,973
1891	678,459	1,978,815	1,693,751	1,156,316	7,006,090
1890	659,636	1,894,712	1,339,695	1,140,559	6,854,864
1889	618,795	1,891,899	1,344,180	835,469	6,304,298
1888	596,218	1,928,638	1,349,044	819,079	6,164,114
1887	575,361	1,948,264	1,396,161	832,817	6,438,361
1886	569,649	2,018,173	1,610,949	860,125	6,968,915
1885	558,809	1,976,480	1,755,605	822,262	6,336,805
1884	535,953	1,925,670	1,890,733	916,158	6,237,606

VALUE OF LIVE STOCK ON HAND

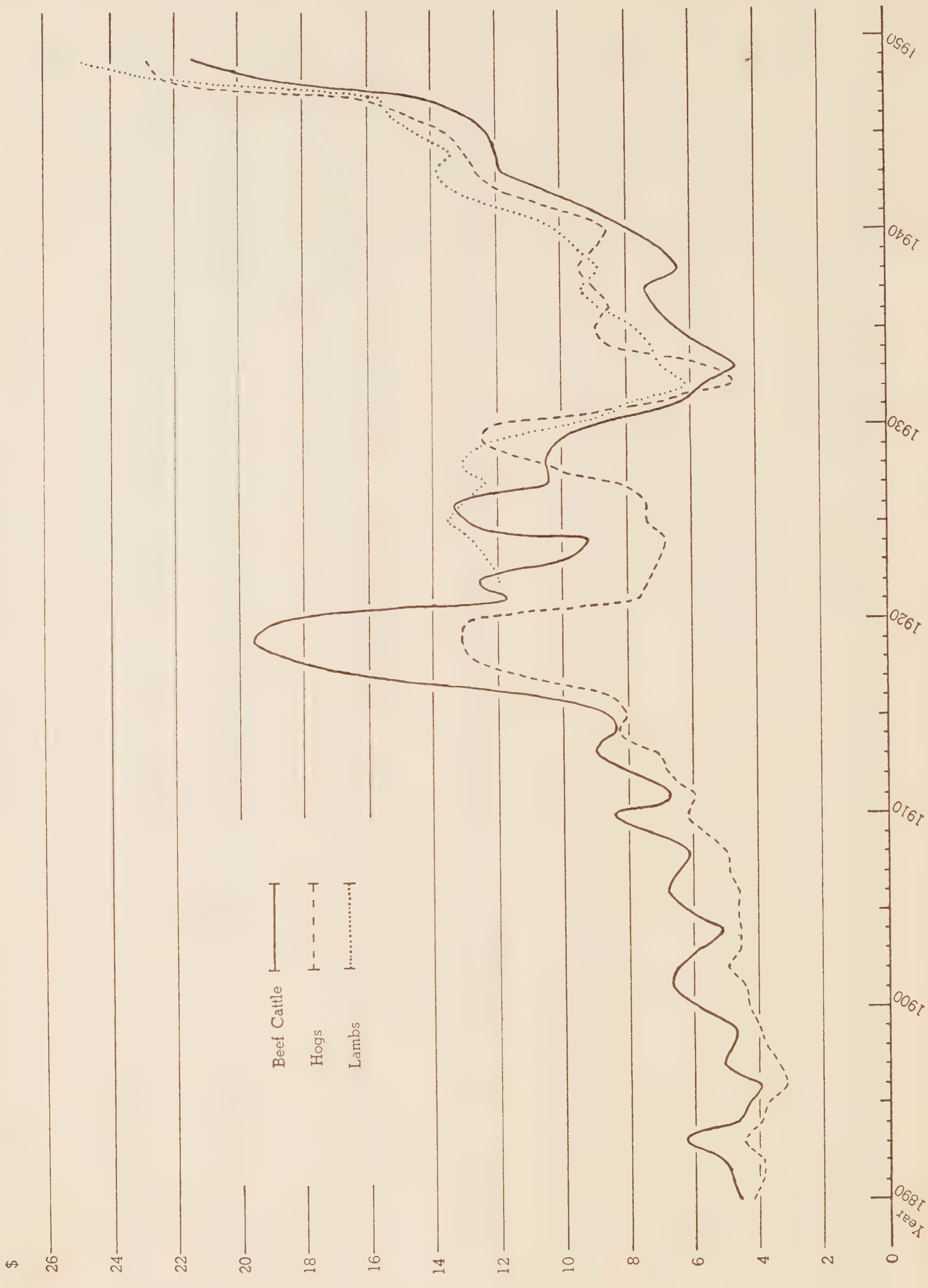
The following table gives the value of Horses, Cattle, Sheep, Swine and Poultry on hand in June of each year for the sixty-six years, 1884-1949, except for the years, 1884-1891, when farm live stock was valued in bulk.

Years	Horses	Cattle	Sheep	Swine	Poultry	Total
	$	$	$	$	$	$
1949..........	36,454,000	359,551,900	8,646,200	81,960,500	31,734,000	518,346,600
1948..........	40,374,400	326,199,400	8,881,500	61,776,000	29,102,000	466,333,300
1947..........	44,885,000	270,250,000	8,891,000	59,754,000	36,445,000	420,225,000
1946..........	41,965,000	206,991,000	8,266,000	44,716,000	28,283,000	330,221,000
1945..........	44,165,000	183,326,000	6,714,000	36,921,000	25,762,000	292,688,000
1944..........	44,581,000	151,655,000	5,612,000	22,720,000	18,224,000	242,792,000
1943..........	44,909,000	145,061,000	5,833,500	20,800,000	16,929,000	233,532,500
1942..........	47,779,000	125,648,900	5,797,000	21,317,966	13,163,448	213,706,314
1941..........	45,633,501	119,265,685	5,117,342	19,580,527	11,230,889	200,827,944
1940..........	57,885,423	102,535,567	6,458,560	20,690,702	14,600,381	202,170,633
1939..........	63,494,747	90,905,107	5,666,615	17,066,957	14,448,250	191,581,676
1938..........	54,709,549	88,251,957	5,805,219	18,751,968	13,698,332	181,217,025
1937..........	57,286,273	93,360,874	6,088,540	15,462,386	13,989,813	186,187,886
1936..........	61,229,630	76,949,305	5,790,872	13,313,339	12,416,378	169,699,524
1935..........	57,946,376	72,031,320	5,488,972	12,348,955	11,987,918	159,803,541
1934..........	54,492,559	66,581,103	5,335,210	10,971,007	11,631,434	149,011,313
1933..........	49,889,016	69,379,352	5,533,134	8,732,796	12,036,762	145,571,060
1932..........	43,507,517	78,323,693	5,111,312	7,219,718	10,418,176	144,580,416
1931..........	50,528,572	91,834,417	6,652,107	11,987,324	10,729,925	171,732,345
1930..........	60,606,827	136,496,344	10,835,770	18,643,164	13,372,682	239,954,787
1929..........	66,603,793	150,480,760	12,457,554	20,430,803	13,473,814	263,446,724
1928..........	67,085,352	128,937,680	11,209,872	19,808,890	12,452,203	239,493,997
1927..........	66,724,527	117,162,152	10,433,761	24,159,535	12,333,645	231,145,720
1926..........	68,239,756	115,386,214	9,688,685	24,525,126	12,400,985	230,240,766
1925..........	69,787,791	115,844,069	9,576,722	24,424,238	13,527,454	233,160,274
1924..........	72,617,565	113,046,599	7,081,500	16,201,699	13,446,621	222,393,984
1923..........	74,542,351	109,467,066	6,597,087	19,018,668	12,401,083	222,026,255
1922..........	74,535,855	103,899,416	6,612.959	16,550,636	12,241,252	213,840,118
1921..........	75,680,750	103,861,565	8,207,564	19,205,488	11,168,318	218,123,685
1920..........	89,606,594	176,897,490	16,191,741	32,253,804	11,787,708	326,737,337
1919..........	92,823,683	184,041,594	18,128,240	33,263,051	11,351,364	339,607,932
1918..........	95,710,928	172,259,261	15,690,055	31,140,181	9,307,051	324,107,476
1917..........	99,439,558	150,309,828	9,946,030	21,464,366	8,517,195	289,676,977
1916..........	101,434,391	128,324,526	7,386,710	18,790,755	7,933,157	263,869,539
1915..........	107,982,037	115,363,336	6,403,907	17,562,726	7,670,326	254,982,332
1914..........	112,576,793	106,635,148	6,155,451	17,951,258	7,551,428	250,870.078
1913..........	113,240,047	95,759,022	6,242,672	15,393,192	6,956,952	237,591,885
1912..........	109,000,214	90,403,902	6,181,595	14,141,908	6,121,323	225,848,942
1911..........	103,373,206	84,634,962	6,213,021	14,593,917	5,905,318	214,720,424
1910..........	92,757,431	76,872,723	6,127,018	13,265,834	5,393,031	194,416,037
1909..........	87,682,689	75,247,197	6,262,493	11,144,135	4,411,386	184,747,900
1908..........	85,847,391	77,255,267	6,336,265	12,135,979	4,439,854	186,014,756
1907..........	85,041,144	79,485,780	5,928,325	14,174,502	4,854,381	189,484,132
1906..........	79,814,953	80,303,276	6,721,119	12,770,708	3,697,338	183,307,394
1905..........	73,911,177	76,764,482	6,191,774	12,280,667	3,335,660	172,483,760
1904..........	68,138,228	72,821,003	6,425,100	12,921,743	3,077,029	163,383,103
1903..........	61,811,456	69,289,924	7,228,498	13,023,743	2,973,646	154,327,267
1902..........	55,173,637	63,517,342	7,634,284	11,262,265	2,957,286	140,544,814
1901..........	50,038,465	59,527,119	7,772,793	9,298,712	2,859,172	129,496,261
1900..........	46,916,999	56,320,810	7,711,496	9,598,153	2,727,363	123,274,821
1899..........	42,713,557	52,938,500	7,315,729	10,180,338	2,658,321	115,806,445
1898..........	38,659,896	47,286,254	6,499,695	8,720,242	2,578,136	103,744,223
1897..........	36,111,805	42,683,557	6,003,194	6,533,210	2,318,038	93,649,804
1896..........	37,185,692	44,383,638	6,652,202	6,505,227	2,130,807	96,857,566
1895..........	40,283,754	46,708,017	7,708,442	7,101,211	2,156,623	103,958,047
1894..........	46,245,614	47,577,587	8,606,671	6,909,262	2,208,518	111,547,652
1893..........	50,527,472	47,718,025	9,016,118	6,622,129	2,187,158	116,070,902
1892..........	55,812,920	45,548,475	8,569,557	5,479,093	2,091,450	117,501,495
1891..........	....	....	....	....	....	108,721,076
1890..........	....	....	....	....	....	104,086,626
1889..........	....	....	....	....	....	105,731,288
1888..........	....	....	....	....	....	102,839,235
1887..........	....	....	....	....	....	104,406,655
1886..........	....	....	....	....	....	107,208,935
1885..........	....	....	....	....	....	100,690,086
1884..........	....	....	....	....	....	103,106,829

VALUES PER HEAD OF LIVE STOCK AND POULTRY ON HAND FOR THE YEARS 1892 TO 1949

Years	Horses all Ages	Cattle		Sheep and Lambs	Swine all Ages	Poultry all Kinds
		Milch Cows	Other Cattle			
	$	$ c.	$ c.	$ c.	$ c.	$ c.
1949	91	174 00	88 21	16 89	37 37	1 28
1948	95	144 00	89 91	15 54	34 93	1 15
1947	99	129 00	66 98	13 32	26 62	1 19
1946	90	110 20	42 76	11 79	22 21	95
1945	90	95 40	38 89	9 27	18 66	90
1944	88	81 53	35 21	7 62	11 96	66
1943	86	79 32	34 33	7 91	11 03	63
1942	90	68 69	31 33	8 41	11 45	53
1941	85	65 20	29 89	7 73	10 19	49
1940	103	55 42	27 43	7 88	10 36	64
1939	113	49 42	24 86	6 69	11 04	63
1938	98	46 75	28 39	6 76	13 11	61
1937	103	47 96	28 92	6 96	10 60	62
1936	109	43 40	19 86	6 53	9 45	54
1935	103	40 56	18 71	5 80	10 08	52
1934	97	36 94	17 53	5 54	9 31	51
1933	88	38 41	17 87	5 73	6 94	52
1932	75	43 42	20 18	4 92	5 25	45
1931	87	52 79	22 49	6 37	8 81	45
1930	100	73 11	32 42	9 55	11 22	59
1929	110	80 34	35 61	11 02	12 15	61
1928	110	68 33	30 09	11 05	10 80	63
1927	108	60 92	27 05	10 91	12 83	65
1926	108	59 14	26 84	10 93	14 13	70
1925	108	58 55	27 70	11 03	14 55	76
1924	109	55 41	27 05	8 14	8 96	80
1923	111	55 24	25 14	7 27	10 96	82
1922	109	52 68	24 25	6 70	10 65	88
1921	109	51 56	24 77	7 59	12 28	97
1920	127	85 84	44 67	14 34	19 98	1 07
1919	129	88 71	46 37	16 45	19 62	97
1918	131	83 55	45 52	16 14	18 80	76
1917	130	75 54	39 55	10 39	12 89	63
1916	131	66 35	34 91	8 13	10 83	55
1915	139	60 83	32 18	7 05	9 93	54
1914	145	57 01	30 81	6 67	10 14	53
1913	151	50 56	27 29	6 27	9 51	51
1912	147	47 82	25 61	6 05	8 31	47
1911	140	45 31	24 07	5 97	8 36	46
1910	128	40 76	22 43	5 75	8 50	43
1909	120	38 19	21 45	5 54	7 18	37
1908	118	36 90	21 13	5 54	6 67	36
1907	117	36 43	21 15	5 36	6 92	36
1906	116	35 99	21 62	5 15	7 02	36
1905	110	35 06	21 29	4 68	6 44	34
1904	104	34 70	20 84	4 41	6 43	33
1903	97	34 15	20 58	4 40	6 59	31
1902	88	32 96	19 46	4 45	6 69	30
1901	81	31 74	18 57	4 41	6 23	29
1900	76	31 01	17 93	4 29	5 42	29
1899	69	30 31	17 41	4 13	5 16	28
1898	63	28 28	15 98	3 88	5 31	28
1897	59	26 13	14 58	3 55	5 08	27
1896	60	27 60	15 05	3 60	5 12	28
1895	62	29 74	16 08	3 81	5 47	28
1894	69	31 02	17 15	4 27	6 05	29
1893	74	31 63	17 78	4 66	6 54	31
1892	81	29 95	17 69	4 63	5 50	30

YEARLY AVERAGE PRICE PER 100 POUNDS LIVE WEIGHT OF BEEF CATTLE, HOGS AND LAMBS
AT TORONTO YEARS 1890 TO 1949



ADDRESSES

ANNUAL CONVENTION ONTARIO CROP IMPROVEMENT ASSOCIATION

WEST ANNEX, COLISEUM, EXHIBITION PARK, TORONTO
JANUARY 18, 19, 20, 1950

Containing proceedings for

Potato, Registered Seed, Turnip, Northern Ontario, Hay-Pasture and General Sessions

"CANADA'S FIRST CONSERVATION DAY"
Heber Down's Farm, Brooklin

ONTARIO DEPARTMENT of AGRICULTURE

CROPS, SEEDS AND WEEDS BRANCH

Published by Authority of Col. The Hon. T. L. Kennedy, Minister of Agriculture

L. B. MEHLENBACHER, Cayuga
President-Elect

Ontario Crop Improvement Association, 1950

TABLE OF CONTENTS

GENERAL CROP MEETING

REGISTERED SEED GROWERS' MEETING

POTATO MEETING

TURNIP GROWERS' MEETING

NORTHERN ONTARIO MEETING

READERS NOTE

Due to unavoidable circumstances, summaries of panel discussions and some addresses have not been included in this publication. These include:

Quiz — "Developing Markets for Registered Seed"
Chairman, W. E. Breckon, Freeman. *Panel*, Alex. M. Stewart. Ailsa Craig; Garnet B Rickard, Bowmanville; Harold K. Nesbitt, Britannia Bay.

"Discussion on Varieties"
Panel, Dr. G. P. McRostie, Prof. J. C. Steckley, A. G. O. Whiteside.

Question Period (Potatoes)

"Consumer Appeal"
Miss Laura Pepper, Chief. Consumer Section. Dominion Dept. of Agriculture, Ottawa Discussion.

Panel Discussion
Led by Frank Strong. Guelph, with Harold Shantz New Hamburg, grower; R. C Thompson, Lynden, shipper; E. T. Pike, Stratford, retailer; Edithemma Dighton, Home Economist, H.E.P.C., Toronto, consumer.

Guest Speaker
Louis Bromfield, Malabar Farm, Lucan, Ohio.

"Good Features of County Crop Improvement Association Programmes" (Panel Discussion)
Chairman, Alex. Davidson. Agincourt *Panel*, composed of members from Bruce, Middlesex, Waterloo, Haldimand and York.

Quiz — "Forage Harvesting Methods"
Chairman, Watson Porter, Editor, Farmer's Advocate, London. *Panel*, Prof. E. G Webb, Dept. of Agricultural Engineering, O.A.C., Guelph; John Hargreaves, Beachville, Hay King, Oxford Grassland Day; Jos. Lanthier, Leitchcroft Farms, Gormley, baling and barn drying; Clark Young, Milliken, chopped hay; Thos. Dickison, Ottawa Dairy Farm, City View, grass silage: J. J. E. McCague, Glenafton Farm, Alliston — hay drier.

FOREWORD

GOOD crops can only be obtained with first class seed. Poor seed may carry some of the most noxious weed-types and if used, land becomes so badly infested that it would take years for its elimination.

Annual Meeting of the Ontario Crop Improvement Association is held each year in order that Ontario farmers can discuss with specialists, methods of improving crops, obtaining the best seed and complete eradication of weeds and pests of all sorts.

This year's program included some of the continent's best agriculturists, men who by long experience and research, have learned what can be done. This knowledge, imparted in their lectures and in discussion, could not possibly be memorized by any but the wizard.

For that reason this little booklet is published. It contains a complete record of all addresses. In it, the most technical details of scientific research, about which lecturers spoke, is set down in black and white so that anyone may read it.

I commend the publication as well as the Ontario Crop Improvement Association for its successful convention and years of activity.

To farmers interested in improving crops and farms, I suggest that you secure a copy and place the book where it will be available as a handy reference.

Were it a textbook prepared by some publisher, it might cost a large sum. However, it is yours for the asking.

Secure your copy and preserve it for future reference.

THOMAS L. KENNEDY,
Ontario Minister of Agriculture

OFFICERS AND DIRECTORS, 1950

ONTARIO CROP IMPROVEMENT ASSOCIATION

Honorary President......Col. The Hon. T. L. Kennedy, Minister of Agriculture
Past President......H. H. McNish, Lyn
President......L. B. Mehlenbacher, Cayuga
First Vice-President......J. B. Graham, Copetown
Second Vice-President......Wm. Wallace, Woodslee
Secretary-Treasurer......A. H. Martin, Toronto
Crops, Seeds and Weeds Branch, Ontario Department of Agriculture

District	*Director*
Essex, Kent, Lambton	William Wallace, Woodslee
Middlesex, Elgin, Oxford	Andrew G. Murray, Wilton Grove, R.R. 1
Haldimand, Norfolk, Brant	L. B. Mehlenbacher, Cayuga
Perth, Huron, Bruce	Harry Strange, Hensall
Grey, Simcoe North, Simcoe South	J. A. Lowe, Meaford
Peel, York, Dufferin	Alex. Davidson, Agincourt
Wellington, Waterloo, Halton	W. J. Schneller, Baden
Wentworth, Lincoln, Welland	J. B. Graham, Copetown
Victoria, Ontario, Durham	Howard Harper, Goodwood, R.R. 2
Peterborough, Northumberland, Hastings	W. W. Dawson, Peterborough, R.R. 1
Lennox and Addington, Prince Edward, Frontenac	G. E. Shephard, Kingston, R.R. 1
Carleton, Renfrew, Lanark	Andrew Johnston, Renfrew
Leeds, Grenville, Dundas	A. D. Ralph, Kemptville, R.R. 4
Glengarry, Stormont, Prescott, Russell	Stanley Wightman, Lancaster
Thunder Bay, Rainy River, Kenora	L. R. May, Kakabeka Falls
Nipissing, Parry Sound, Muskoka	Russell Riddle, Rutherglen
Temiskaming, Cochrane	Geo. Hackett, Cochrane
Sudbury, Algoma, Manitoulin	Ernest Beaudry, Verner

COMMITTEES

Registered Seed Committee

Chairman — John A. Stewart — Ailsa Craig.

Directors —

Ottawa Valley	Ed. Wallace, Bells Corners
Quinte District	G. B. Rickard, Bowmanville
Georgian Bay District	A. A. McTavish, Paisley
South Central District	W. E. Breckon, Freeman
Southwestern District	Wm. Wallace, Woodslee
Northern Ontario	C. F. Rice, New Liskeard

Potato Committee

Growers —

Lloyd Logan	Mountain
Chas. McGuire	Colborne
Howard Harper	Goodwood
Roy Hickling	Barrie, R.R. 2
Clifford Faint	Hornings Mills
E. G. Snyder	Preston
Edgar Hewitt	Simcoe
W. A. Vail	Denfield
G. A. Hackett	Cochrane

Department —

F. K. B. Stewart	Co-operation and Markets Branch, Toronto
Warren McNiven	Fruit Branch, Toronto
H. N. Racicot	Botany Division, Central Experimental Farm, Ottawa
R. E. Goodin	Crops Branch, Toronto
J. A. Garner	Agricultural Representative Branch, Toronto
Prof. J. C. Steckley	Ridgetown
D. L. Parks	Kemptville Agricultural School, Kemptville
Dr. G. P. McRostie	Ontario Agricultural College, Guelph

Turnip Committee

Growers —

Bruce	Harry Hossfeld, Walkerton
Oxford	Lewis Thomson, Embro
Huron	Harold Hunter, Exeter
Waterloo	Harold Shantz, New Hamburg
Wellington	John Houser, Guelph
Middlesex, Perth	Irwin Scott, Lucan
Wentworth, Brant	J. A. Charlton, Paris, R.R. 1
York, Ontario, Victoria	Stanley Ward, Uxbridge

Ontario Department of Agriculture —

Prof. Jas. Laughland	Ontario Agricultural College, Guelph
George Gear	Walkerton
R. E. Goodin	Crops Branch, Toronto

Dominion Department of Agriculture —

J. J. Johnson	London
F. Strong	Box 218, Guelph

Turnip Shippers' Association

C. Stovel	95 King Street East, Toronto
C. Thompson	Lynden
I. K. Martin	85 Ainslee Street, Galt

Seed Marketing and Publicity Committee

H. K. Nesbitt	Britannia Bay
G. E. Shepherd	Kingston, R.R. 1
Clark Young	Milliken
L. B. Mehlenbacher	Cayuga
M. C. Allen	Heaslip
W. W. Dawson	Peterborough, R.R. 2
Alex. M. Stewart	Ailsa Craig
Wm. Wallace	Woodslee
Dr. G. P. McRostie	O.A.C., Guelph
J. W. Mackay	Dominion Dept. of Agriculture, Ottawa
A. H. Martin	Toronto
W. E. Breckon (Chairman)	Freeman
R. E. Goodin (Secretary)	Toronto

Representatives to Royal Winter Fair

John A. Stewart	Ailsa Craig
Frank Marritt	Keswick
Howard Harper	Goodwood
Lewis Thomson	Embro

Representatives to Ottawa Winter Fair Board

T. Albert Wilson	Pakenham
J. A. Dawson	Plant Products Div., Ottawa

Representative to Western Fair Association

A. G. Murray .... Wilton Grove

Representative to the Ontario Federation of Agriculture

GARNET RICKARD........................Bowmanville

Representatives on the Ontario Fertilizer Board

ALEX. M. STEWART........................Ailsa Craig DR. L. H. NEWMAN........................Merrickville

Representatives to the Canadian Horticultural Council

Potato Section — HOWARD HARPER, Goodwood
Turnip Section — LEWIS THOMSON, Embro

Courtesy of Farmer's Advocate

MR. AND MRS. LENNOX HONOURED AT CROP IMPROVEMENT CONVENTION. W. J. W. Lennox, formerly of the Production Service, Dominion Department of Agriculture, received travelling cases and his wife was presented with a large bouquet of red roses during a special presentation at the annual banquet of the Ontario Crop Improvement Association. The gifts were given in appreciation of the valuable work done by Mr. Lennox in the interests of crop improvement. Above, from the left, are: Mr. Lennox, Mrs. Lennox, and L. B. Mehlenbacher, Cayuga, new President of the Ontario Crop Improvement Association, who made the presentation.

PRESIDENT'S ADDRESS

by H. H. McNish, Lyn

On behalf of the officers and directors of the Ontario Crop Improvement Association, it gives me a great deal of pleasure to welcome you to our Annual Convention. We hope that you will find our new associations agreeable and that our new place of meeting is satisfactory.

The association of a group of producers with the manufacturers who make the tools that we work with, seems to be a logical thing. I hope that we may have a long, agreeable and profitable association with the Ontario Fruit and Vegetable Growers' Association and with the Ontario Retail Farm Equipment Dealers' Association. It has been known for some years that our Association, in order to serve to the greatest extent possible, had to have more room. I hope the move that has been made will be successful.

I wish to thank all those who have contributed so much during the last year to a successful year's operations. It is not possible to include everyone and I will only try to mention a few. The directors of the Association who have given their time so freely during the past year. The County Secretaries who contribute so much to the success of the county organizations. The farmers who co-operate in conducting and reporting on projects, I consider the very life blood of the Association.

I also wish to thank the Director of the Crops, Seeds and Weeds Branch, Mr. Martin, who is secretary-treasurer of the Association, for the capable manner with which he has helped us carry on our work during the past year. I also wish to include Mr. Goodin, our fieldman and secretary of several of the committees, and all of the rest of the staff of Mr. Martin's office.

The assistance that is always so freely given by the Ontario Agricultural College, the Central Experimental Farm and various other institutions is greatly appreciated.

To all of the above and others who have so generously and ably assisted, I wish on behalf of the officers and directors to give our very hearty thanks.

At the present time, there is considerable unrest in regard to our market situation. I maintain that a good program of production tends to stability and confidence. The farmer who has his granary full of grain, his mows full of good hay and his silo full of ensilage isn't likely to be stamped unduly by an unfavourable market situation. I am very happy to have been associated with this organization in the assistance it has given to the production program as formulated by the Ontario Department of Agriculture in 1947.

The results obtained from this production program have been quite satisfactory and are an indication that an organized effort can get results. It is true that in 1949 our production of feed grain fell considerably short of the 200 million bushels aimed at, but the achievement of 168 million bushels under the very adverse weather conditions can be recognized as being quite successful.

Any program of production should include the improvement of our pastures and forage crops. The various pasture projects as they have been demonstrated by our association have shown the way to better production. A great

deal can also be done to improve the quality of our hay crop. I am looking forward to our Grassland Days demonstrating methods of making better hay. Good quality hay in conjunction with a good pasture program can save millions of bushels of grain each year.

It is disappointing that we have not been able to make greater use of new varieties of grasses and legumes that have been produced. There are apparently some difficulties to overcome in regard to isolation in growing the above mentioned crops. To suit Ontario conditions, I think some thing should be done. After all, these new varieties are produced to make better quality forage and even though the identity of these crops is lost to some extent, they will still have served their purpose in the better quality of feed produced.

Considering the decreased demand for our farm products that has been evident in recent weeks, maximum production may not be as pressing a need as it was during the war and some of the post war years. Economical production, I believe, is our greatest need today. The greatest control that we can have over our own affairs is in the good farming that each of us can do. I believe that the Ontario Crop Improvement Association is well qualified to demonstrate good farming.

A good soils policy has always been an objective of our Association. This last year has seen added emphasis given to soil building and soil conservation and we are further committed to a vigorous policy in this regard.

The demand of consumers in general for cheap food, food produced at a price that doesn't permit the proper maintenance of our soils, is a dangerous policy.

There is little more new land left in the world to exploit for the production of cheap food and it is becoming increasingly important to properly use that which we have. Consumers in general should be made to realize that a cost of production that won't permit proper maintenance of our soils is equally dangerous to both consumer and producer.

The Annual Meetings of other years have been looked upon as the highlight of our year's work. The publication of the addresses given at this Annual Meeting, in book form, is a source of valuable information that every farmer should have. I am sure that the information it contains will be of benefit throughout this coming year.

I hope that in 1950 we may have even greater success than we have had in other years.

ANNUAL REPORT OF THE SECRETARY-TREASURER

by A. H. Martin

A DECISION was made at the last annual Crop Improvement Association to direct more of the activity of the organization toward soil conservation and management. This resulted in a number of new projects, highlighted by Canada's first Conservation Day, and the successful negotiations with Louis Bromfield, Malabar Farm, Lucas, Ohio, to address the 1950 Crop Improvement Association banquet.

Another decision of great importance made by the Directors was to change the date and place of annual meeting to the Coliseum in conjunction with the Ontario Farm Equipment Dealers' Show. The three Grassland Days, the Wheatland Day, county Drainage Days, spray days, crop days and other special events continued to prove successful and attract large crowds.

Directors, Branch Secretaries and Presidents took an active part in formulating and presenting briefs to the Select Committee on Conservation. The Association's own brief offered the services and facilities of the organization in carrying out demonstrations which would keep before the public the many approved practices which can be incorporated into any farm program for the protection, conservation and restoration of our soil and water resources.

During the year the Seed Growers' Committee has made a careful study of organization problems in the hope of finding ways and means of providing greater service to the seed growers of Ontario and at the same time provide a closer relationship with the Canadian Seed Growers' Association. This work has resulted in definite recommendations to be presented at the 1950 annual meeting.

The Potato Growers' Committee had an active year, culminating in a tour to the Maritime Provinces and Maine by 65 growers.

The Turnip Committee was handicapped by a partial crop failure due to aphids but seized the opportunity to pursue intensive studies in insect control with new chemicals which we hope will eventually prevent further crop failures due to insect injury.

In the reorganization of the Ontario Fertilizer Advisory Board, the O.C.I.A. has been allowed two representatives in place of one on the Board.

Field demonstrations continue to be the major form of activity. Drought in many sections of the Province rendered some of these demonstrations ineffective, but in spite of this handicap, branch annual reports indicate many useful and valuable observations from these field demonstrations. Attention to field demonstrations is drawn through field meetings, plot tours and twilight meetings. Attendance at annual branch meetings is increasing.

The success of the activities of the Association may be attributed to the following:—

1. The splendid co-operation of farmers and farm organizations.
2. The close association maintained with the Extension Service in that in most cases the Agricultural Representatives act as branch secretaries.
3. The excellent support extended to the Association by Federal and Provincial officials, by industrial organizations and by radio and the press.
4. The support, interest and assistance of the many branch officers and demonstration co-operators.

The 1949 Annual Meeting and Seed Display

The 1949 annual meeting was held at the King Edward Hotel, Toronto, on February 7 to 9. There were special sessions on turnips, potatoes, registered seed, winter wheat and Northern Ontario. A potato luncheon with an attendance of 400 and an annual banquet with 600 were held. The sessions were

fully covered by the daily farm and weekly press, and some sessions were recorded for broadcasting. Dr. Sydney E. Smith, President, University of Toronto, was the banquet speaker.

All addresses were printed in booklet form and 20,000 copies were distributed. Requests were received for this publication from United States, England, Scotland, New Zealand and Norway.

The seed display, featuring county exhibits and individual lots of seed for sale, provided a splendid opportunity for the sale and purchase of seed. Catalogues listing seed for sale were available. Educational exhibits were appreciated.

Crop Improvement Projects

Total projects undertaken	389
Total number of co-operators	1,447
Approximate acreage under projects	4,800

Pasture Projects

Between 1944 and 1947, 2071 long term pasture demonstrations were laid down on 488 farms. Sixty per cent of these plots are still in operation. Long term pastures have proven somewhat more successful in Western Ontario than in Eastern Ontario.

Commencing in 1948, 30 problem pasture plots were laid down, in some cases with remarkably successful results. Sixteen additional problem pasture plots were added in 1949.

Commencing in 1949, demonstrations on improved hay pasture mixtures were started with a total of 88 plots. Both the problem pasture and hay pasture demonstrations will be continued in 1950.

Special Field Days

Type of Field Day	Place	Farm of	Attendance
Grassland	Cornwall	County Home	2,000
Grassland	Peterborough	F. W. Rowland	2,000
Grassland	Thamesford		6,000
Wheatland	Gormley	Leitchcroft Farm	2,000
Conservation	Brooklin	Heber Down	12,000

Seed Fairs and Displays

Seed Fairs and Displays	32
Number of Exhibitors	1,183
Number of Entries	3,174
Attendance	22,430
Distributed in Prizes	$7,436.95
Cereals Offered for Sale (bushels)	78,044
Forage Seeds Offered for Sale (pounds)	41,800
Potatoes Offered for Sale (bags)	9,243

Royal and International Grain Shows

Ontario growers continued to support the two great national seed shows with large numbers of exhibits.

	Total Ontario Prizes	Championships	Reserves	Firsts
Royal	424	1	2	35
Chicago	46	1	2	5

Winners of Championships and Reserves:

Royal Winter Fair —

Grand Championship —
Potatoes........Theodore Despatie, Hanmer
Reserve Grand Championships —
Peas........A. C. Douglas, Chippawa
Barley........J. E. Bradley, Stittsville

Chicago —

Championship —
Alfalfa........Mac Gibbons, Admaston
Reserve Championships —
Soybeans........Wm. R. Beattie, Staples
Peas........Gustav Stein, Matheson

High Yield Competitions

Five Hundred Bushel Potato Clubs:

Total Clubs		18
Total Contestants		350
Contestants with Over 800 Bushels		2
Contestants with Over 700 Bushels		7
Contestants with Over 500 Bushels		60
Club with Highest Average Yield	Middlesex	487
Contestant with Highest Yield	Frank Rick, Trout Creek	836

Fifty Bushel Winter Wheat Club:

Seventeen counties with 234 competitors completed the competition. The 1949 Provincial winners are:

1. Chas. E. Osborne........Bowmanville
2. A. M. Sherwood........Freeman
3. Alan Walper........Parkhill
4. E. F. Metcalfe........Petrolia
5. L. R. MacMillan........Norwood
6. W. E. Breckon........Freeman
7. R. K. Squair........Bowmanville
8. Ronald Moyer........Grimsby
9. W. B. Parnall........Drumbo
10. Walter Pullen........Beachville

High Yield Soybean Competition:

There were 85 competitors in four districts. The Provincial prize winners are:

1. Rosaire Rivait........Comber (Essex)
2. A. E. Mann........Fletcher (Kent)
3. Allistair Littlejohn........Wallacetown (Elgin)

National Barley Contest

The National Barley Contest was changed from a field and grain competition to a straight grain competition with a special class at each seed show. The first and second prize winners are eligible to compete in the championship class for provincial honours at the Ottawa Valley Seed Show.

Boys' and Girls' Grain and Potato Clubs

The Crop Improvement Association trophies awarded to the highest ranking Grain and Potato Club team at the 1949 Provincial Contests were won by:—

Grain:

Ailsa Craig Grain Club........Chas. Bannister, Ailsa Craig, R.R. 1
Jack McLaughlin, Port Hope, R.R. 1
Coaches — W. K. Riddell, W. T. Abraham, Dept. of Agriculture, London

Potatoes:

Durham County Potato Club........Elliott Dunbar, Port Hope
Lloyd Martin, Newcastle
Coaches — E. A. Summers, Sidney McDonald, Dept. of Agriculture, Bowmanville

In the National Club Contests, both Ontario teams stood second with grain team one point and the potato team two points below the Dominion Champion teams.

Directors' Meetings

Four Directors', one Executive and twenty-one Committee Meetings were held during the year.

Summary

Each of the 55 branches of the Association is represented by an official delegate at this meeting, and many branches have sent in addition one or more delegates. These delegates have the responsibility of carrying back to their respective branches the material presented at this conference. The annual meeting is now looked on as the clearing house for all new ideas and advanced methods in field crop work. All branches must press on to reach higher goals and plan programs in keeping with the demands of the times. Careful planning of the year's work is important. Much depends on selecting suitable co-operators. Every effort should be used to encourage the maximum number of people to see the demonstrations. The value of a demonstration is in direct relationship to the number of people who observe it.

I am glad of this opportunity to extend thanks and pay tribute to the branch secretaries. Their interest, energy and initiative in no small way contributes to the success of the branch activities. Appreciation is also extended to the 1136 farmers who make up the officers and directors of the 55 branches.

In conclusion, may I join with our President in expressing thanks to all officers and co-operators and to extend our appreciation to all organizations, institutions and individuals who so generously contributed their time, services and funds in stimulating and encouraging the 1949 Crop Improvement program.

Courtesy of Farmer's Advocate

Conservation Day 1949 — Ontario County

ONTARIO CROP IMPROVEMENT ASSOCIATION

STATEMENT OF RECEIPTS AND EXPENSES FOR THE PERIOD

January 1 to December 31, 1949

RECEIPTS

Bank Balance, December 31, 1948	$ 609.53		
Less Outstanding Cheques	185.00	$ 424.53	
Fees — Affiliation	$ 142.67		
Membership	59.50	202.17	
Grant — Department of Agriculture		500.00	
Soybean Prize Money		600.00	
Banquet and Potato Luncheon		1,676.86	
Potato Tour to Maritimes		8,057.43	
Bank Interest		7.90	$11,468.89

EXPENSES

Potato Tour to Maritimes		$ 7,305.56	
Potato Luncheon and Banquet		2,228.82	
Soybean Contest Prizes		400.00	
Barley Competitions		200.00	
Membership to Federation of Agriculture		25.00	
Auditor's Fee		15.00	
Bank Exchange		15.84	
Miscellaneous — Wreath		6.90	
		$10,197.12	
Bank Balance, December 31, 1949	$ 1,321.77		
Less Outstanding Cheques	50.00	1,271.77	$11,468.89

Petty Cash on Hand, December 31, 1949 — $13.38

I hereby certify that the above statement sets forth the Association transactions as recorded in the records for the year ending December 31, 1949.

(Sgd.) J. ALLAN,
Auditor

January 12, 1950

MARITIME POTATO TOUR

RECEIPTS

Total Receipts	$ 8,057.43		
Less Exchange	7.29	$ 8,050.14	

EXPENDITURES

C.N.R. — Sixty-five Fares and sleepers	$ 4,204.10		
C.N.R. — Meals	505.99		
Advance Cheque, R. E. Goodin, *re* Meals, Hotels, etc.	2,400.00		
Medical Services	3.15		
Pictures	143.50		
Folders, Printing, etc.	18.82		
Gratuities	30.00	$ 7,305.56	
Balance		$ 744.58	
Received from R. E. Goodin, Refund on Advance Cheque		33.73	$ 778.31

RESOLUTIONS FROM THE GENERAL SESSIONS

ONTARIO CROP IMPROVEMENT ASSOCIATION CONVENTION

January 18, 19, 20, 1950

Resolution 1—*Labelling Seed Corn*

Moved by Wm. Wallace, Seconded by W. W. Dawson:

Whereas a number of farmers throughout Ontario have on occasions purchased seed corn which after planting showed very poor germination.

Therefore be it resolved that the Ontario Crop Improvement Association assembled in Annual Convention at Toronto, petition the Dominion Department of Agriculture to amend the regulations of the Seed Act or take such other steps as are necessary to insure that all seed corn offered for sale shall include in the labelling, the month and year of the official germination test.

It is further recommended that the Plant Products Division be requested to have the seed inspectors check very clearly any carryover of seed corn in retail dealers hands.

Resolution 2—*Brush Burning in Northern Ontario*

Moved by Ernest Beaudry, Seconded by Geo. Hackett:

Whereas most settlers holdings must be cleared and the brush burned before the land can be farmed and whereas present restrictions imposed by the Department of Lands and Forests are such that the complete clearing of new land is rendered nearly impossible thus reducing the benefits of the Land Clearing Policy under the Department of Agriculture.

Therefore be it resolved that the Ontario Crop Improvement Association support its branches in Northern Ontario in their request to the Department of Lands and Forests that the restrictions surrounding brush burning on farms be relaxed to the extent that land clearing can be proceeded with in such a manner as to be a benefit to the farmer and still not be a menace to forest growth and that additional assistance in the form of supervision be given by the local departments of Lands and Forests in the burning of dangerous areas.

Resolution 3—*Pasture Plots*

Moved by Wm. Wallace, Seconded by W. W. Dawson:

Whereas pasture plots now laid down are of value as illustration plots and

Whereas permanent and long term pastures will eventually become a part of every livestock farm in Ontario from a soil fertility as well as a feed and pasture economy standpoint.

Be it resolved that further attention be given to a 1950 pasture project in which yields, gains and losses be accurately determined and recorded on experimental plots over as wide an area as possible in the Province.

Resolution 4—*Barberry and Buckthorn*

Moved by J. R. Ostler, Seconded by A. D. Ralph:

Whereas Barberry and Buckthorn are prevalent in some areas in Ontario and

Whereas these noxious weed shrubs act as host to rusts of some of our grain crops.

Be it resolved that the Ontario Crop Improvement Association assist in obtaining financial support from the Ontario Department of Agriculture for a program of eradication of these shrubs.

Resolution 5—*Facilities at Kemptville Agricultural School*

Moved by J. R. Ostler, Seconded by L. Earl:

Whereas need is shown for research on problems of a regional nature in Eastern Ontario such as adaptability of improved grasses and legumes and production of new varieties as well as testing new cereal varieties,

Be it resolved that the Ontario Crop Improvement Association support the request of the Eastern Counties that further space and facilities be made available at the Kemptville Agricultural School to conduct this work satisfactorily.

Resolution 6—*New Varieties of Grasses and Legumes*

Moved by A. Stewart, Seconded by C. F. Rice:

Whereas seed of improved varieties of grasses and legumes has not been multiplied in sufficient quantities to become easily available to farmers for hay and pasture improvement,

Be it resolved that the Ontario Crop Improvement Association assist in taking measures to provide for multiplication and distribution of seed of improved varieties for general use.

Resolution 7—*Field Demonstrations*

Moved by J. R. Ostler, Seconded by A. D. Ralph:

Whereas the need for data on practical field research and demonstrations over a period of time is increasing,

Be it resolved that further funds be made available to County Crop Improvement Associations for compiling data of this nature.

Resolution 8—*Grant to District Seed Shows*

Moved by Ed. Wallace, Seconded by H. Nesbitt:

Whereas County and District Seed Shows play an important role in encouraging the use of good seed,

Be it resolved that the Ontario Crop Improvement Association support the request that the Ontario Department of Agriculture assist in securing financial aid for these seed shows from the Dominion Department of Agriculture.

Resolution 9—*Seed Treatment*

Moved by J. R. Ostler, Seconded by N. Humphries:

Whereas treatment of seed is essential in controlling certain seed borne diseases,

Be it resolved that the Ontario Department of Agriculture be requested to subsidize the cost of an accepted seed treater installed by seed cleaning plants doing custom work and further that an educational program be instituted to stress the value of seed treatment.

Resolution 10—*Weed Act*

Moved by J. R. Ostler, Seconded by Wm. James:

Be it resolved that the Ontario Weed Act be further strengthened to make it possible for farmers to be protected from the menace existing in neighbouring infested areas.

Resolution 11—*Cost Studies*

Moved by J. R. Ostler, Seconded by H. H. McNish:

Whereas cost of production information on Agricultural products in Eastern Ontario is lacking,

Be it resolved that the Ontario Crop Improvement Association support the request for the establishment of a department of Cost Accounting at the Kemptville Agricultural School in order to obtain Cost of Production figures for crops grown in the counties of Eastern Ontario.

Resolution 12—*Natural Springs*

Moved by Wm. Wallace, Seconded by W. W. Dawson:

Whereas many natural springs in Northern Ontario could be used as a water supply providing piping of this water could be arranged,

Be it resolved that the Ontario Crop Improvement Association support the request that a Subsidy similar to that applied on well drilling be arranged to assist in piping natural springs as water supplies.

Resolution 13—*Ditching*

Moved by Wm. Wallace, Seconded by W. W. Dawson:

Whereas many farmers and settlers in Northern Ontario have the necessary time to dig their own ditches for draining their land and

Whereas in order to qualify for subsidy under the ditching regulations they must have the work done by large machinery,

Be it resolved that the Ontario Crop Improvement Association support the request that subsidy under the ditching scheme be payable in cases where the settler digs his own ditch providing the cost does not exceed any tendered cost.

POTATO SECTION

Resolution 1—*Restricted Seed Production Areas*

Moved by G. A. Hackett, Seconded by C. Wallwork:

Whereas the maintenance of satisfactory supplies of high quality disease-free potatoes is of fundamental importance in the potato industry,

Be it resolved that the Potato Section of the Ontario Crop Improvement Association heartily endorses the proposals recently made to establish restricted areas for certified seed and urge the preparation of suitable legislation for consideration at the forthcoming session of the Ontario Legislature in hope that two or three areas may be established in the Province at the earliest possible date.

Resolution 2—*Restricted Area*

Moved by G. A. Hackett, Seconded by E. D. Anderson:

Whereas seed potatoes from the Cochrane area are used principally by Southern growers for the purpose of improving the quality of their seed,

Be it resolved that the Ontario Department of Agriculture consider the advisability of making the Cochrane area a restricted area free from Bacterial Ring Rot.

Resolution 3—*Subsidy on Freight Shipment of Northern Grown Potatoes*

Moved by G. A. Hackett, seconded by Edgar Hewitt:

Whereas many Southern Ontario growers hesitate to make arrangements for their seed supplies from Northern Ontario until the Freight Assistance Policy on Northern grown seed is announced each year,

Be it resolved that the Freight Assistance Policy be made more of a permanent policy to enable Southern growers to buy with more confidence of obtaining assistance with the freight.

Resolution 4—*Storage and Marketing Facilities*

Moved by Howard Harper, Seconded by Chas. Mcguire:

Whereas the potato grower organizations in the Shelburne-Hornings' Mills area of Dufferin County and also the Hanmer-Blezard Valley area of Sudbury district are to be commended on their construction during the past year of central co-operative storage grading and packing facilities and

Whereas it is favourably noted that several dealers have made provision for more adequate facilities in potato growing areas to properly merchandise Ontario potatoes, and also that numerous growers have built suitable farm storages and installed equipment for grading,

Be it resolved that we the potato growers of the O.C.I.A. recommend similar procedure in other suitable potato growing areas.

Resolution 5—*Support of High Yield Clubs*

Moved by Chas. Maguire, Seconded by H. Harper:

Whereas the benefits obtained by high yield clubs in cutting costs of production, improving quality and improving the soil have been considerable,

Be it resolved that we the potato growers of Ontario heartily extend our thanks for the co-operation of the many service clubs, municipal and county councils, commercial companies and community spirited local citizens, in making these high yield clubs such a success.

Resolution 6—*Newsletter*

Moved by Edgar Hewitt, Seconded by C. Wallwork:

Whereas the potato industry is increasing in importance in Ontario,

Be it resolved that consideration be given to the preparation and distribution of a newsletter devoted to all phases of the Potato Industry.

Resolution 7—*Scab Research*

Moved by H. Harper, Seconded by C. Wallwork:

Be it resolved that in view of the encouraging report presented to this meeting by Dr. Berkley, appreciation of this work be extended to the Scab research committee and

That this work be continued on an equal or more extensive scale and that we the growers offer our every co-operation

Resolution 8—*Research on Quality*

Moved by C. Wallwork, Seconded by E. Hewitt:

Whereas it is known that the balance of plant nutrients in the soil affects the cooking quality of potatoes,

Be it resolved that recommendations be made to further research on this problem with special emphasis on the effect of phosphorus.

Resolution 9—*Cost of Production*

Moved by C. McGuire, Seconded by C. Wallwork:

Be it resolved that we the potato growers of Ontario heartily commend Dr. Patterson and staff of the Farm Economics Branch on their survey and detailed report on costs of production.

That we respectfully request that the study be continued with detail given to storage and marketing.

Resolution 10—*Marketing Containers*

Moved by Howard Harper, Seconded by Edgar Hewitt:

Whereas Ontario potatoes are sent to market in all sizes and shapes of bags making an unattractive package,

Be it resolved that this matter be brought to the attention of the proper authorities and that necessary regulations be brought into effect to insure the marketing of potatoes in standardized bags.

Resolution 11—

It is with regret that the Potato Growers' Section of the Ontario Crop Improvement Annual Meeting learns of the illness of Mr. R. E. Goodin. We wish to express to Mr. Goodin our appreciation for assistance and guidance throughout the year and best wishes for a speedy recovery.

TURNIP SECTION

Resolution 1—*Aphid and Cabbage Maggot Control*

Be it resolved that we the Turnip Growers of Ontario commend the work done by the Department of Entomology, O.A.C. toward the control of Aphids and Cabbage Maggot and respectfully request that this work be continued and expanded in 1950.

Resolution 2—*Soils and Fertilizers*

Be it resolved that we also commend the work done by the Soils Department, O.A.C. in conducting demonstrational work in cultural and fertilizing practices and we also urge that this program be continued and expanded.

Resolution 3—*Quality*

Whereas quality is of supreme importance in increasing and maintaining sales volume,

Be it resolved that we the Turnip Growers of Ontario request the assistance of the Ontario Department of Agriculture and the Dominion Department of Agriculture in maintaining quality by their continuance of a rigid inspection service on both export and local markets.

Resolution 4—*Advertising on American Market*

Whereas we feel that Ontario Turnips should be advertised on the American market to help increase the demand for them,

Be it resolved that the Dominion Department of Agriculture, the Ontario Department of Agriculture and the Department of Trade and Commerce be requested to assist in such an advertising program.

Resolution 5—*Consignment Shipping*

Whereas the customs of consignment shipping and peddling by truck are factors in demoralizing our markets,

Be it resolved that we condemn these practices as being detrimental to the best interests of the industry.

Courtesy of Farmer's Advocate

GRINDING OUT THE RESOLUTIONS AT KEMPTVILLE.

This Committee prepared the resolutions for presentation at the Annual Conference of the Crop Improvement Associations of Eastern Ontario when they met on January 5 and 6. J. R. Ostler, Agricultural Representative for Leeds (left), was Chairman of the Committee and with him, left to right are Andrew Johnson, Renfrew; Clifford A. Eligh, Finch, and Alvin D. Ralph, Kemptville.

GENERAL CROP MEETING

THE FARM OUTLOOK FOR 1950

by **W. P. Watson, Commissioner of Livestock,**
Ontario Department of Agriculture

At this time last year Canadians were deploring the fact that British contracts for bacon, cheese and eggs had been reduced by almost fifty percent. Some farm leaders were so pessimistic about the situation as to predict that depression was just around the corner. In spite of those gloomy forecasts the national farm income was about 2.4 billion dollars, just a few million less than in the peak year of 1948. The decline was due to poor crops in many parts of Canada rather than to any dislocation of markets created by the reduction in export contracts.

During recent weeks the farm outlook for 1950 has occupied prominent space in our daily papers. Unfortunately, most of the forecasts have been very disappointing to farmers; so much so that the pessimists are now sure that the depression is almost upon us. Indeed the outlook is not as bright as it was one year ago, neither is it as dark as it is being painted in some reports.

Above Pre-war

The plain facts are that world food production is now above pre-war levels. Hence importing countries can be more selective and discriminating when choosing imports. As a result Canada is experiencing greater difficulty in finding export markets for her surpluses and particularly in convincing Great Britain that she should continue to purchase large quantities here at prices above those being asked by other countries that have surpluses to sell.

For as long as most of us can remember, Britain has been the largest importer of foodstuffs in the world while Canada and United States have been among the largest exporters. An export market is more important to Canada than to United States because our surpluses, although smaller in total quantity, make up a much larger percentage of our total production. Throughout the years Great Britain has provided our most important market. She has also played a major role in the development of this country. Most people in Canada proudly point to the fact that their ancestors came from the British Isles. While Britain was exporting immigrants to this country she was also investing dollars. By 1939 investments in North America had reached a point where the interest therefrom paid for well over 60% of the food purchased on this continent. Under such circumstances Britain did not have to sell large quantities of manufactured goods here to balance her trading accounts. This left her relatively free to explore and develop markets in other parts of the world and to establish her reputation as the greatest trading nation in the world.

Unfortunately the war changed that situation. For over two years Great Britain and her Dominions fought alone. In order to purchase the equipment and foodstuffs needed to fight a total war, Britain was forced to liquidate most of her dollar investments. As a result of this forced action the interest accruing from those that remain will pay for only a small percentage of what

she would like to purchase from this country. Moreover such expedients in International financing as mutual aid and marshall aid are rapidly diminishing, and are being replaced by more orthodox methods.

It must now be obvious to every Canadian that Britain cannot continue to purchase large quantities of foodstuffs and pay for them in our kind of money unless she is given an opportunity of earning that money by selling more goods in dollar countries. It must be equally obvious that the loss of the British market for Canadian products will have serious repercussions on the agricultural economy and eventually the whole economy of this country. Canada must therefore import more from Britain. This does not necessarily mean an increase in overall imports, but rather a transfer in the source of supply for goods purchased outside this country. Britain on the other hand may find it necessary to change her tactics of selling all over the world and concentrate on sales to North America.

Failure to solve the monetary differences between the two countries leaves Canada with the alternatives of seeking markets elsewhere or reducing production more in line with domestic need. The task of finding alternate markets in a world in which most of the countries possessing dollars have surpluses of products similar to our own is well nigh impossible. To reduce production in a country with such potentialities in production and such a relatively small, consuming population is almost unthinkable. Nevertheless, it may have to be done in the case of products that leaped into prominence during the war years.

In Prairies

Canada's greatest tract of agricultural land lies in the three prairie provinces. Two thirds of the total production of those provinces must be marketed outside the area of production and preferably outside the Dominion of Canada. Approximately two thirds of the acreage is sown to wheat and other grains each year, and the western farmer prefers to sell it immediately after harvest as grain rather than through cows, pigs and chickens. Only when the price of grain sinks to depression levels does live stock figure prominently in western economy.

Eastern Canada on the other hand depends on the live stock industry. In our own province over seventy percent of the farm income is derived from the sale of live stock and live stock products. Despite this fact we do not normally produce large surpluses of many products. The most notable exceptions are apples and potatoes in the maritimes and dairy products in Ontario and Quebec.

In the light of these facts, Canada's agricultural problem would be well on the road to solution if markets could be found for these large surpluses produced in Western Canada. The prospects are fairly bright for the next two or three years at least. That statement is based on the assumption that responsible countries will carry out the undertakings they have assumed through the signing of International Agreements.

For the past four years, Canada has been selling wheat to Britain under a bilateral agreement made in 1946. That agreement terminates with the present crop year, which year also marks the first one covered by the International Wheat Agreement. Under the terms of the bilateral agreement

Britain will purchase 140 million bushels at $2.00 per bushel in 1949-50. Because of a special arrangement between the two countries, Britain will take less than that quantity this year and will divert the dollars saved in so doing to the purchase of bacon, cheese, fish and base metals.

Under the terms of the International Wheat Agreement four or five major exporting countries have agreed to sell, and some fifty or more importing countries have agreed to purchase between 500 and 600 million bushels of wheat annually at prices ranging between a maximum of $1.80 per bushel (U.S.) and a minimum of $1.50 per bushel for 1949-50, with the minimum price being reduced by 10c. per bushel per year until a floor of $1.20 is reached in 1953-54, the last year of the agreement. Canada's share of this total quantity is 203 million bushels. Any wheat sold in excess of that amount must be offered in the open market for what it will bring. Canada's domestic consumption of wheat amounts to 145-150 million bushels annually. Hence wheat marketing problems could arise any time production exceeds 350 million bushels, a feat that might be accomplished during any reasonably favourable growing year.

Russia and Argentina

Russia and Argentina are not signatories to the world wheat agreement, hence are not bound to sell within any fixed price schedule. Although Russia is a large producer she has seldom produced enough wheat to feed her own people. Argentina on the other hand normally has large surpluses. Any attempt on her part to offer large quantities at less than the minimum price might prove a threat to the stability of the agreement, but that threat is not likely to materialize as long as the world is short of bread.

Not only has the price of wheat been fixed within certain limits, but minimum prices have also been established for oats and barley. At present the floor prices are approximately 60 cents and 90 cents per bushel respectively, F.O.B. Fort William. Both grains have been selling well above the minimum prices due largely to competition between buyers in Eastern Canada. Exports have virtually ceased because prices are well above those prevailing in United States, our principle export outlet for these commodities.

Now that the price of grain has been established within certain limits, the gross farm income of Western Canada is subject only to the vagaries of the weather. By fixing the price at fairly profitable levels the pattern of production for the current year has been determined. It is a foregone conclusion that western farmers will follow their natural inclination and produce more grain and less live stock in 1950. With a higher guaranteed price for wheat than for coarse grains, the wheat acreage is likely to be above last years peak of 27 million acres, provided weather is favourable at seeding time. This increase will be at the expense of coarse grains.

Favourable Omen

In view of this probable trend, Eastern farmers need not look for cheap feed grain in 1950, except or unless there is a complete collapse in the world wheat agreement. Contrary to the opinion held in some quarters this is a favourable omen. Down through the years there has never been a collapse in live stock prices in advance of a severe break in grain prices. When grain prices collapse, farmers all over the world turn to hog production in an effort

to bolster their incomes, and this action eventually leads to a collapse in live stock prices. Furthermore, when grain prices are high the inefficient producer is squeezed out or limits his production to the number that can be finished with the grain produced on his own farm.

Contracts for live stock products plus government subsidies or floor prices are at rates approximately 10% below those prevailing last year. The mere prospect of lower prices will undoubtedly discourage production of live stock in some parts of Eastern Canada and sooner or later bring about a closer relationship between supply and demand. A sharp liquidation in poultry flocks has already taken place, and the number of sows marketed since the first of the year has registered an increase. If this trend continues much longer the balance between supply and demand may be reached sooner than expected and Canada won't have to worry about surpluses of bacon or eggs. As in the past the farmer who follows a consistent line of production will win out in the end.

This is no time for panic, but rather a time for careful planning. The farmer who intends to raise large numbers of grain consuming animals would be well advised to increase his grain acreage and at the same time follow those practices which tend to produce maximum yields. Live stock prices are still above those prevailing in most parts of the world and perhaps are a great deal higher than they will be two or three years hence. In view of possible declines later on, 1950 might be a good year to do some careful culling.

As we enter 1950, slightly lower prices for live stock products appear inevitable, but the real signs of depression are still not apparent. When wheat becomes a drug on the market, and feed grain becomes cheap, and Western Canada starts producing over 3 million hogs per year, live stock prices are definitely slated for a sharp decline. If this occurs at a time when unemployment starts to mount, and wages are cut, and consumer buying power is substantially reduced by virtue of unemployment or lower wages, then depression and all the sufferings associated with it is not far away. Fortunately, these evil omens are not visible to any alarming degree as we enter the second half of the twentieth century, a half century in which Canada will undoubtedly go forward to greater achievements in world affairs.

Courtesy of Farmer's Advocate

Spraying potatoes with a power machine on farm of E. G. Snyder, Waterloo County

SOIL BUILDING PROJECTS
FOR
COUNTY CROP IMPROVEMENT ASSOCIATIONS

***by* J. A. Garner, Director of Extension, Ontario Department of Agriculture**

It is heartening, I believe, to all of us gathered here who are interested in the productiveness of the soil and its relation to the economic life of the country, that exponents of conservation have gathered much support during the past twelve months. People from many sections of soceity have become active disciples of soil improvement and related problems.

Evidence is to be found in varied directions. Farm organizations and farm leaders are discussing soil and soil management more than ever before. Press and radio have found an increased interest among their readers and listeners. The activities of the Select Committee of the Ontario Legislature on Conservation have been followed with interest and favour throughout the Province, and the report of the Select Committee to the next Session of the Legislature is awaited.

It is of particular significance to note that following the announcement of Colonel, The Honourable T. L. Kennedy to this group in February last, to the effect that the Ontario Government had set aside an appropriation to give encouragement of Land Use and Soil Improvement Projects, many farm groups expressed their desire to participate in an active program. Seventeen counties have initiated special activities and have either received, or will receive, financial assistance from the Department of Agriculture on a dollar per dollar basis.

In thinking of County Soil Building Projects, it might be of particular interest to many assembled at this meeting, to review, very briefly, some of the undertakings on a County level, since the projects reflect the problem peculiar to soil types and farming practices of various areas of the Province.

In the Counties of Renfrew, Carleton, Stormont, Lanark,' Glengarry, Grenville and Hastings, projects undertaken were designed to focus attention on drainage, and to demonstrate the practicability and efficiency of modern machinery in the construction of open ditches, laying of tile and the removal of fence bottoms, etc. Nearly 7,000 people attended demonstrations in the eastern counties just mentioned. Farm drainage is a moot question with Eastern Ontario farmers and municipal bodies.

Planning Projects

Farm planning projects have been undertaken in five Counties — Peterborough, Leeds, Simcoe South, Wellington and Ontario. In all but Ontario County, the undertakings were limited to two or three phases of farm planning. In Ontario County, however, various aspects of farm planning were carried out, some of which were drainage improvement, grassed waterway establishment, water control by terracing, contour plowing, wood-lot improvement and planting, and improvements to farm buildings. Nearly 12,000 people attended the special demonstration held on the farm of Mr. Heber Down, in Ontario County.

Simcoe North has concentrated on an educational program and has initiated the pasture improvement project on problem soil areas. Halton County has been interested in the construction of ponds, with a view of studying the effect of same on the water level and water supply.

Programs initiated in Wentworth, Haldimand, Leeds and Essex, have given special attention to the use of agricultural limestone, and indicative of the progress made in some of these areas is reflected in a report from theCounty of Wentworth, to the effect that 560 tons of agricultural limestone were used in 1947, and more than 3,500 tons were used on the farms of Wentworth in 1949.

In the Counties of Waterloo and Essex, educational programs have been designed to focus attention on the need of organic matter in soils, with special attention to the place of legumes and grasses in cropping practices and soil management. At the run-off plots near New Hamburg, in Waterloo County, records have been maintained on water and soil loss under various crop covers and practices.

The local organizations in Haldimand, Kent and Middlesex Counties are in the planning stage and the programs being discussed call for activities that will relate to the maintenance and restoration of organic matter in the soil.

If we study these various county activities, I believe we might make this general observation — that the Eastern Ontario farmer is interested in improved drainage facilities and he is interested in better drainage because it will permit him to carry out practices that would lead to a better balanced crop rotation and a larger acreage of legumes. A very large section of Central and Western Ontario is primarily interested in the maintenance and restor-

Courtesy of Farmer's Advocate

THEY HAVE THE ANSWERS TO MANY SOIL AND CROP PROBLEMS.
Seated, from left: L. B. Mehlenbacher, Cayuga, 1950 President of Ontario Crop Improvement Association; A. H. Martin, Toronto, Secretary; J. B. Graham, Copetown, First Vice-President. Standing: J. A. Garner, Director of Extension, Department of Agriculture, Toronto; and Clark Young, Milliken, a good farmer closely associated with the Ploughmen's Association.

ation of organic matter. A more limited area is concerned with the factors that will lead to correction of soil acidity and a larger acreage of clovers in the crop rotation.

If these observations are substantially correct and if we acknowledge the practices of many successful farmers throughout the Province, then a part of every County program should be *increased acreage in clovers and grasses*.

In the Province of Ontario there are possibly upwards of 120,000 practicing farmers. Experts in crop rotation recommend that at least 20%, or ⅕ of the cropping acreage be seeded to small seeds yearly. In other words, we are investing two to three million dollars in grasses each year. The average farmer is investing from two hundred to three hundred dollars yearly. If the average man is going to follow out the recommendations of the experts, then we might reasonably ask ourselves if some further effort should not be made to reduce seeding costs.

For some time, seed growers, special committees and others have been studying problems relating to production of clover seed. I do not believe it would be improper to examine every aspect of clover seed production and ask yourselves if everything is being done that might be done. Has the combined knowledge and abilities of the practical man, the research man and the technical man been used to the full in developing practices and techniques that will lead to higher yields in alfalfa, red clover and alsike?

New improved strains of grasses and clovers have been, and are being developed. The plant breeders and the Experimental Stations have made valuable contributions in this connection. The farmer has "know how" and the facilities to produce grass seed in abundance. Surely we have the capacity and the knowledge to work out some sound and sensible method to multiply and distribute these improved varieties, so that all of us who are among the older group in this room, may reap the advantages of these improved varieties within the period of our active life.

These suggestions I submit are worthy of consideration by your Provincial Association.

In the East

For a moment or two let us sit down with the farmers of Eastern Ontario. In that section of the Province, as most of us appreciate, a very large portion of the farm revenue is derived from the dairy herd. Pastures and forage crops carrying protein, are vital to economic production and the maintenance of soil fertility. Many of the farmers that I meet with in Eastern Ontario say that they are looking for legumes and grasses suitable for their varied conditions, and that some of the recommendations now being made are not too satisfactory.

Probably we have arrived at the place where County Crop Improvement Associations should be thinking of carrying out some of their projects on a regional basis. As a suggestion, I wonder if we could not visualize certain very real advantages developing from a project where counties might join together. For instance, Eastern counties with similar problems might join together in procuring a farm, or portion of a farm, where promising varieties of grasses could be tested under varying conditions and on sufficient scale to demonstrate their place in the farm program of the Eastern Ontario farmer.

In Central and Western Ontario, we have substantial areas of rich soil where the majority of the farms are classed as pasture farms. These areas are used primarily for the grazing of beef cattle and have been so used for many years.

During recent years, the Ontario Agricultural College, individual farmers, and others have carried out undertakings designed to improve old pasture lands, but relatively few beef cattle farmers have seen fit to alter their grass farm management. I do not believe, however, that beef cattle men are disinterested, because whenever beef cattle men get together, pasture is usually the subject of conversation. The questions that are usually asked are: What is the best way of rejuvenating the old pasture farm? What mixture should be used? Will it pay off?

It may be that County Crop Improvement Associations and live stock men could find some of the answers to these questions by tackling the job on a regional basis. For instance, Counties with substantial pasture farm areas might join together in acquiring a typical grass farm or two. Representative farmers from these interested areas might consult with the technical men and work out a definite program which would embrace methods of re-seeding, seed mixtures, pasture management, cost records of the various procedures employed in the carrying out of the undertaking and records of setting out the cost of producing beef where these newer practces are employed.

It may be that this suggestion has doubtful merit, but, I believe, I might say here, that the Ontario Department of Agriculture would welcome suggestions from people who are interested in this thesis.

Directors of the Ontario Crop Improvement Association held their June Meeting at O.A.C., and joined executive members of the Waterloo County Branch and the Waterloo County Council for an afternoon on a tour of pasture plots, potato farm, and other points of interest in Waterloo County.

Gentlemen, the Ontario Crop Improvement Association enjoys an enviable record. A reputation for good leadership. Be there good times or periods that are not so good, we are but trustees of the land on which we live. By individual and combined effort we can leave the land more productive than when it was handed to us.

Congratulations Mr. President and officers of 1949, on a very fine job, and may success attend the activities of the Association in 1950.

MILK PRODUCTION FROM GRASS PRODUCTION

by Thos. Dickison, Ottawa Dairy Farm
City View

Gentlemen, this is an extensive subject to cover in the time at my disposal, so rather than go over it in narrative form, I am going to answer a series of questions which are frequently asked us at the Ottawa Dairy Farm.

I don't wish to convey to you the idea that I have set myself up as and authority on the making of grass silage. The methods I will outline to you do make a good quality silage for us, but conditions vary from farm to farm and I hope that anyone listening to me will realize this and before setting out to make grass silage, consult with others who are obtaining satisfactory results using other methods.

I am very fortunate in being situated close to the Experimental Farm, whose advice and help has been of great value to us at Ottawa Dairy Farm, and also having for an employer the Borden Company, who have been very co-operative in all my ventures. They are vitally interested in anything which will enable the milk producer to operate more economically.

Why Make Grass Silage?

Good hay is the cheapest source of nutrients for our dairy cattle and grass silage seems to me to be the surest and most economical way to harvest, store and feed that good hay.

By making grass silage you greatly increase the amount of protein and dry matter you can obtain from an acre of land.

By harvesting a major portion of your forage crops as silage you will be practically free from the vagaries of the weather, eliminate almost all manual labour, reduce your labour costs, reduce your storage costs, greatly reduce the fire hazard, provide your cattle with better pastures and effectively control the propagation of weed seeds.

What Crops Can be Used to Make Grass Silage?

Just about anything your cattle will eat green can be used to make grass silage. You will make better silage from good crops but you can also make better feed from poor quality crops as silage, than you can as dry hay.

What Seed Mixture Do You Use?

We don't use any special mix. We follow the department recommendations quite closely and try to use a seed mix which will be adaptable to any purpose — silage, pasture or dry hay.

Some orchard grass in your mix will fit in very well with a grass silage operation. It is quite mature when we start cutting and adds a good deal of fibre to that early clover or alfalfa. We are also quite keen on orchard grass in our pastures. Some ladino will also help prolong your cutting season, as it seems to hold its moisture to a later date than red clover. When you have it, it is also grand in your pastures. By the way, some orchard grass certainly helps keep the ladino up for easier cutting. Ladino is not very nice to handle as dry hay. There is too much moisture and it is difficult to cure.

You will make much better silage if you have a fair amount of grass in your mixture. It is a must if you are not using a preservative.

At What Stage Do You Cut for Silage?

We cut at all stages as long as there is enough moisture in it to make silage and get a pack. We try to get quite an early start, say just before clover is in 1/10 bloom. I think it could be cut even earlier, but bulk or tonnage is quite important with us and earlier cutting would sacrifice this to some extent.

Your big problem is to have enough moisture in your silage. If you have not got enough there will be spoilage and waste. If you have too much moisture you will have seepage and very likely a quite objectionable odour, which your cows won't mind but your wife certainly will. At this point it may be well to warn you that some care has to be exercised in feeding grass silage. I am quite satisfied that cows can eat quite strong smelling silage and not contaminate the milk, but if the odour is fresh and strong in your barn at milking time, the warm milk will pick up this odour.

Do You Wilt Your Silage?

Yes, if necessary. We try to ensile it at about 70% moisture. In early June for example, we may wilt it for two hours, and later in the season, we will be picking it up two minutes after it has been cut, to insure having enough moisture. If you are putting up very wet silage, I would advise using barley meal at about 80 lbs. to a load. You can empty a bag over your load before blowing it up into the silo. If you are using the type of machine which mows and chops in one operation, I advise barley meal as a preservative especially with June silage. Later on it would not be necessary. Also with this very moist silage I would use a longer cut.

Do You Use Preservative?

We have not used a preservative for three seasons now and have made quite satisfactory silage. Although I would certainly recommend to anyone beginning to be sure of enough moisture and to use a preservative as added insurance.

When Your Silage Ready to Put in Silo?

We have stayed clear of any contraptions for this purpose and depend entirely on a grab test which is quite simple. Take up a handful of chopped silage and squeeze it tight. Open up your hand. If the silage springs open quickly it is too dry, if it stays compressed in a ball it is too wet. It should open up as we watch it, not too fast or too slowly. But don't worry too much about each individual load. It is more the average of a days cutting that is important. If you have put in silage on a rainy day do not be in too much of a

hurry to add to it. Let it heat a little. If on the contrary you have put up some too dry, follow it up with some on the wet side. We generally like to get the first 10′ of our 40′ silos in on the dry side and when we get to the top we want it very wet.

We have found it good practice to unroll a roll of building paper up the inside of the doors just to be very sure of a good seal.

I feel that tramping in the silo can be overdone. We seem to make better silage by keeping tramping at a minimum until we reach the top, then we really tramp, refill, tramp, refill, etc., until our silo just can't hold another forkfull. At this stage we start to tramp, and every day for three weeks we give each silo a very thorough tramping. This year the Experimental Farm people opened our silos and we had only 6 to 8 inches of spoilage on our 20′ wide silos.

While we are filling we do no tramping, simply go up once or twice a day and level off the cone that forms in the centre.

What Machinery Do You Use?

First of all we use a grain swather to mow with, cutting 15′ at a swath. This machine leaves the cut grass in a window, free of stones, without the need of raking. It does not dry out as fast as mower cut hay, it eliminates the job of raking, with its resultant loss of leaves and also quite an important factor, it leaves the hay all lying in one direction so that your forage harvester can pick up and handle a much wider swath than it could of raked hay.

There is another feature we are only just beginning to appreciate connected with this swather. We did have our troubles at first trying to get it to cut low enough finally being satisfied with a cut about 2 inches higher than we would cut with a mower. After two seasons experience with it I find we are not only leaving two inches of stubble but we are also leaving all the young second growth and these small shoots are protected by this stubble. Our second growth recovery is quite remarkable.

Still another factor in favour of this machine is that if it rains heavily on this window it does not become soggy like raked hay. The rain to a large extent seems to run right through it. We use this same machine for cutting our timothy, following it with a baler and the improvement in quality of this swather cut hay is quite remarkable over that hay made in the conventional manner with mower and rake. It retains its green colour and suffers very little shattering even with late hay.

We use a conventional type forage harvester powered by its own 45 H.P. motor, with a 52″ pick-up and an 18½″ throat to pick up, chop and blow into our trucks. (It is important to see that your knives are always cutting sharp, not tearing or shredding.)

At our silo we are now using a new type auger crop-blower and we are very pleased with it. It has a 15 H.P. motor but I would prefer a 25 H.P. motor, and it is mounted on a permanent cement block. Our silos (4) are all in line so to change silos we just move our blower and lengthen our belt or vice versa. Some of these crop blowers are not designed too well, and I would advise anyone to look them all over quite carefully before investing in one.

I mentioned earlier that we had practically eliminated manual labour from this set up.

Our unloading system is a home-made outfit, known locally as the mouse, powered by a ¾ H.P. motor, mounted on an old truck frame. It consists of a series of belts and pulleys powering a winch with a final speed of 6 or 7 R.P.M. from the 1750 R.P.M. at the motor. There is an old auto transmission included so that we can operate at different speeds and in reserve.

Before loading we set up in our truck box a false front with a cable running from one corner about 10 inches from the bottom to the end gate of the truck and back to the other corner of the false front.

The truck driver backs his load up to the crop-blower and hitches the winch cable to the false front cable. Some ropes and pulleys enable him to put the mouse into gear or stop it, and his load is tumbled off into the blower in a matter of three minutes. We figure that it takes our trucks about twenty to twenty-five minutes from the time they start to load until they are back in the field ready to load again. The combination of swather and harvester handling a 15′ swath enables us to load our trucks in five minutes. As our distances are large the rest of this twenty-three minutes is taken up by travelling.

We have five men on the job, three on trucks, one on swather and one on the harvester. I mentioned earlier we do no tramping until the silo is almost full.

Cost of Harvesting and Storage Compare With Conventional Methods of Haying?

Before we go into the costs of these two methods on a per acre basis, I would like to say that silage will give you more feed per acre than dry hay, more dry matter and more protein. This, of course, varies considerably but on the average I would say 25% more and if you take into consideration the amount of dry hay that is too badly spoiled each year to be worth little as feed, I'd say at times more than that.

Now to the actual costs. We have already reduced our labour cost by $1.25 per acre using figures obtained in excellent weather for our dry hay operation and I feel sure that our labour costs on silage making can be still substantially reduced. I can't see how we could reduce them much on our dry hay.

Our machinery cost is higher, about 60c. per acre. On a smaller operation this machinery cost would be much higher, at least as far as 100% mechanization was concerned.

Silage making can be carried out to a schedule, with no loss of time or quality of the forage because of the weather. While on a large farm hay making can be a real headache. In 1946 we finished our hay making about the middle of September. We had worked many late nights. There was a lot of work, hay was stacked all over the place and a lot of it was very poor quality.

In 1949, with less than half the men on the job, a bigger crop was all at the barn by July 21, with practically no manual labour, very few late nights and almost 100% excellent quality.

What Kind of Silo Do You Use?

We have cement and cinder block for our grass silage. Thin silos, especially of wood, may allow silage on sides to dry during heat of summer and recede from walls causing spoilage.

Before using a silo for grass that has always been used for corn, be sure it is strong enough. Grass develops a lot more pressure.

Be sure your silo is tight, that doors fit properly and I would advise some drainage from around the bottom or base.

How Feed Grass Silage?

It can be used in any manner. We use it to replace dry hay in our ration except for about one to two lbs. fed at night. We are still feeding some corn silage, but each year are reducing the amount fed.

In feeding grass silage we seem to get better results by keeping it in front of the cows all the time. We feed once a day, what they will clean up in 25 hours. This way also there is less danger, if your silage is strong, of having the odour in the barn contaminate the milk at evening milking.

We are currently feeding a grain ration of about 13% protein. We add just enough supplement to add flavour to our own grains. We feed this grain at about one pound to five or six pounds of milk and have quite satisfactory production.

Our commercial herd of grade Holsteins produced an average of 19,942 pounds in 1949.

I am beginning to feel that with good cattle and first rate forage, including supplementary forage feeding during the pasture season, that we will be producing milk in an amount and at a cost which will pleasantly surprise us, and also that we will be prolonging the usefulness of our dairy cows, a factor which is only lately receiving the prominence it deserves.

What is Ideal Hay Forage?

I would say that ideal hay is that which can be harvested, stored and fed without loss of leaves, with the least deterioration of feed nutrients under all weather conditions, a crop that can be completely harvested by machine without regard to the weather, a crop that can be stored from year to year without deterioration, a crop that will free us from the necessity of purchasing heavy supplies of concentrates.

Again I ask what is ideal hay? Gentlemen, I say grass silage.

MANAGEMENT OF THE CORN CROP

by Wm. Wallace, Woodslee

A few years ago the mention of corn in Ontario brought to mind the broad check-rowed carefully cultivated fields of husking corn in South Western Ontario or the neat straight rows of ensilage corn reaching up and down the gentle slopes of the farms in Central and Eastern Ontario.

As recently as 1942 the program of this Association included papers prepared by Dr. Stevenson, N. D. MacKenzie and Alex Stewart. They presented (to many of us for the first time) the story of Hybrid Corn, often hailed as the greatest single advance in Agriculture in our time. Since then many prominent workers in laboratory, test plot and farm have contributed their findings in a constantly changing development.

To-day after eight years a vastly different picture of the industry appears. In the old corn belt mechanization has taken over almost completely. While farms are often prepared and planted in a single day by powerful smooth running tractors. Now we seldom see in our district the riding cultivator pulled by the slowest and gentlest team on the farm, the driver steering the machine with his feet and stopping now and again to remove a sod or clod of earth from a hill of corn with a stick carried for that purpose. The one-horse scuffler (which was often used until the corn was higher than the horse) is also outmoded. Instead those same tractors are on the job a few days after planting with a spike-toothed harrow, rotary hoe or mounted cultivator or possibly a 2-4-D sprayer. No longer do we see so many fields with rows each way. It is not so necessary with the newer methods of weed control.

Possibly the greatest changes have taken place in harvesting. A team of horses hitched to a wagon with box (high "bang board" on far side) the operator walking along side pulling the ears from the standing stalks and in practically the same motion opening the husks by the aid of a metal husking hook strapped to the palm of the hand, tossing the ear into the wagon box with one hand while the other reaches for another ear-keeping "an ear in the air" is a picture of corn harvesting a decade ago. From one to two acres per day was considered good going. To-day mechanical pickers harvest ten to twenty acres per day with one operator plus a couple of men to unload wagons.

In the ensilage areas thinner seeding contour planting and forage harvesters have changed the picture considerably, but possibly the greatest change has been the extension of the corn crop for grain in Central and Eastern Ontario. This has largely been brought about by the introduction of new early varieties of hybrid seed. The technical story of hybrids has been unfolded many times and time does not permit me to go into that now.

To get down to some of the practical aspects of corn growing, I do not pretend to know all the answers, but I intend to make some suggestions and observations just as one farmer to another with the hope that you may pick up a point or two which you can use.

Corn should be planted on good fertile ground. It requires a little more than the average amount of work so it does not pay to plant on worn out or poor weedy fields. An old pasture with a heavy sod or a field where a heavily fertilized potato or other special crop has been taken off will make good corn

land. Corn will make good use of residue fertilizer. Rich bottom land if well enough drained is better than high light land.

While fall plowing is desirable on real heavy land (you get more benefit from frost action), early spring plowing will generally be better on loamy or sandy soil. We start preparing our soil as soon as it is dry enough to work in the Spring. We try to get it nearly fit to plant about ten days or two weeks before planting time and then leave it stand. This gives annual weeds a chance to germinate. A medium depth working with a disc harrow followed by a smoothing harrow destroys the young weeds and gives the newly planted corn a head start on annual weeds. We plant late maturing corn about May 10, and early maturing varieties from May 24, to early June.

The Ontario Corn Committee which conducts test plots right across old Ontario publishes recommendations regarding varieties for districts in Ontario. This information will appear in farm and local press and will be available in leaflet form from your Agricultural Representative. Planting is best done with a corn planter, but a grain drill is used more often in areas outside the corn belt. Hybrid seed usually germinates 95 to 100% and is generally planted too thick. Stalks standing about 12″-15″ apart in 3′ or 3½′ rows should be about right for grain production in fairly fertile fields. About 200 or 300 pounds per acre of commercial fertilizer applied either broadcast before planting or in hands along side the rows at time of planting will give more rapid early growth and aids maturity, but do not expect it to work any miracles on a low fertility field.

Weed control begins about 5 days after planting if weather conditions are favourable. A light spike tooth harrow can be used 2 or 3 times between the time the corn begins to emerge and until it is about 4 or 5 inches high. It should be drawn at a slow walk preferably on the afternoon of a warm sunny day. Rotary hoes which are a sort of revolving harrow are not quite so severe on the corn, and should be pulled at 4 to 6 miles per hour. Neither of these implements have much effect on Sow Thistle, Canada Thistle or other perennials.

Row Cultivation

Some sort of enter row cultivator with sharp flat teeth is better for these weeds. The regular 2-horse riding cultivator or tractor mounted machine is generally used about 2 or 3 times or at intervals of 7 to 10 days, until the corn is about 2½′ to 3′ high. The first cultivation should be fairly deep and close to the row. Most cultivators are equipped with a sheet metal shield on each side of the row to keep earth from covering the young corn. These shields can be adjusted about an inch or two above ground level which will allow fine earth to roll in towards the hills of corn. This will cover many small weeds. Later cultivation should be shallower and farther from the row to avoid injury to the corn roots. This is important as corn roots are very extensive and soon spread to the centre of the row space and cultivation should close when the corn is about 3′ high. Shields are not used after the corn is about a foot high and shovels or disc which throw the earth towards the corn help to keep small weeds in the row buried. 2-4-D spraying when the corn is about 12″ to 16″ helps to control all weeds except grasses and does not injure the corn seriously if properly done.

Harvesting is possibly the biggest problem facing most growers. Large acreages will be handled mostly by mechanical pickers. These machines are

available in one or two row sizes either pulled by tractor or mounted on the tractor and recently a 2-row self propelled model. Nearly all the major farm machinery companies are handling very good machines which will do good work under favourable conditions. Corn pickers do a cleaner job of removing husks when the corn is tough or damp from dew or fog. Very few pickers make a very good job of removing husks when the fodder is real dry. Some grain is shelled off the ears by the husking rolls and this usually goes in with the ear corn on the wagon. Unloading should be done with a large ensilage fork or a coke fork instead of a scoop shovel so as to leave the shelled corn in the wagon. If it is thrown in with the ears it clogs the air spaces and will cause mouldy corn.

Corn cribs may be in the form of covered slat sided bins about 5′ wide and as long as required temporary cribs can be made of snow fence in circular form about 6′ across, 2 tiers high and placed on rased platforms. Cribs should always be placed where sun and wind can reach them; never in shade of buildings or trees. Temporary cribs are often left uncovered but I think they should be protected if only by corn sheaves.

Where corn pickers are not available to handle a few acres of husking corn, the ears can be readily removed by hand as we did in the corn belt a few years ago. To the inexperienced it is slow and often a rather disagreeable job but it does not take an active man long to get the knack of using a hand husking hook or peg. Fair workers with some experience can easily pick and unload the ears from an acre of good corn in an 8 or 9 hour day. Fairly expert huskers could handle twice that amount.

When other forage crops are in short supply the fodder or stover from corn is an excellent source of rough feed. To save it in the best shape, it should be cut and shocked when the kernels of the ears are well dented and the fodder is just starting to dry and preferably before a heavy frost or the first day after freezing. The shocks should be left in the field for 3 or 4 weeks or until the sap is pretty well gone from the stalks.

In some parts of the country "shredding" machines are available which shred the fodder and blow it into a mow, at the same time removing and husking the ears dropping them into a portable crib or into a wagon box. The best method of using the crop will depend somewhat on the maturity of the corn and the equipment available. If the ears are not very large and the grain a little shrunken, the crop could be run through a cutting box, ears and all. If all or even some of the bigger ears are broken off, the fodder can be put through an ordinary threshing machine. It makes a good job of shredding the fodder. The grain which is threshed out in this way needs to be spread around well as it will heat very quickly. The fodder too will bear some watching after being shredded or cut. Corn fodder saved in this way is equal to medium quality hay for feeding. In fact cattle seem to like it better than dry hay, possibly because it is a little fresher.

Uses of Ear Corn: As mentioned before ears of corn will mould if not properly stored. Ear corn when freshly husked should not be piled up in close bins or left in piles on barn floors or on the ground. Try to get it where moving air can get through it. The best way to use ear corn in cattle rations is to put ear corn along with other coarse grain through a hammer mill. While the cob does not have much feeding value it does no harm in the ration and tends to "lighten" the meal. Ears can be fed to hogs and broken ears of mature

corn thrown in the hen house make up part of the scratch feed ration and are fine to give the hens some exercise on a cold day. Horses (if you have any) will relish 3 or 4 ears of good hard corn. Some farmers lament the lack of corn shellers in their district, but I do not think they are necessary in very many cases. In fact it is very unwise to have much shelled corn around unless the moisture content is down around 15 to 17%.

Disposal of Stalks: Fields of corn stubble or more particularly tramped-over corn stalks are a little more troublesome than ordinary stubble to handle. We make out very well by using a tandem disc rather lightly over such fields in the fall if it is dry enough, and then plowing.

Plowing under corn refuse is best done with a high clearance plow having notched rolling coulters. Trash shields or a trailing wire are also used. To aid decomposition of stalks in heavy soil, plowing under 100 to 200 pounds of cyanamid will be beneficial.

We are all well aware that the corn area has been extended considerably in recent years. I believe that with the more wide-spread distribution of early hybrids it can be extended and intensified still more in the near future. I think that most any live stock farm can profitably use more home grown corn both for grain and fodder. Most commercial grocers in live stock areas will usually find a ready market for corn on adjoining live stock farms. We still import feed corn into Ontario.

Many Central Ontario farmers found that their corn came through the drought of last spring and summer to give them a very welcome supply of fodder when their other crops were a near failure.

Soybeans provide a good cash crop.

GRASS AND LEGUME SEED PRODUCTION—A PROFITABLE ENTERPRISE

by R. M. MacVicar, Division of Forage Plants, Central Experimental Farm, Ottawa, Ont.

MUCH of what I have to say today will not be new to you, but a restatement of the problems and opportunities of seed production in Ontario may be worthwhile at the present time. Of necessity it will only be possible to deal with the subject in a more or less general way.

Canada is both an exporter and importer of forage crop seed. We export large quantities of alfalfa, sweet clover, brome grass, alsike and red fescue and varying amounts of red clover and other species. We import considerable quantities of forage seeds each year, the amount being usually dependent on our own production. Ontario is the major producer of double cut red clover and timothy. Considerable quantities of alfalfa, alsike and sweet clover are also produced, but Ontario has lost its place as leader in the production of these crops. The only other seed crop produced in quantity in Ontario is Canada bluegrass. You will note that in this province we produce seed of only those crops which, if the occasion demands, we can utilize for fodder. In other words, to a very large extent, our production of forage seeds is incidental to our production of hay and pasture. This is our present position. I am concerned in this talk with putting before you some considerations which might influence our Ontario farmers to consider forage seed production as a definite part of their production program.

Obviously, there is little purpose in producing seed if a profitable market is not available. At the present time seed prices are very high and there is a very excellent export demand for Canadian seeds. There are considerations which make us reflect on how long we can expect to find a good market for our seed in the United States. It would appear, however, that for some time to come, we can dispose of high quality seed in that country at a profitable price. I do not think we should be timid in our considerations of markets, because I am quite convinced that if our growers develop the production of forage crop seeds with the same vigor and common sense that they use in growing other cash crops, Ontario grown seed will be able to compete successfully both from the standpoint of quality and price with seeds produced elsewhere.

What of the home market? Because of favourable growing conditions, Ontario is in a favoured position to supply the major portion of the needs of Eastern Canada for seeds of grasses and legumes used in hay and pasture mixtures. We can grow seed of white clover, birdsfoot trefoil, meadow fescue, brome, orchard grass and reed canary grass. These species together with timothy and our commonly grown legumes are what is utilized in our grassland work.

In considering our home market and our export market, however, we must keep in mind that we will be subjected to increasing competition from foreign seeds. I stated a moment ago that we could compete providing we produced seed on a common sense basis. What does this involve? Briefly it means the growing of seeds of our improved varieties of grasses and clovers using modern methods of production and marketing. Our "ace in the hole" is our ability to offer both to our export and home trade pedigree seeds of the improved,

named varieties, of the grasses and clovers which we can grow. This, in my opinion is what should be the hard "core" of any Ontario program. Let us digress a few moments to see where we stand on this matter of the utilization of improved high yielding varieties of grass and clover seeds. Were we to search throughout Ontario today we could not find worthwhile quantities of certified or registered seed of our improved varieties. If I were to ask most of you here today to name even a few of the new varieties, I doubt very much if I would get a satisfactory answer, yet, were we talking about wheat, oats or barley, I am sure the variety names would slip readily off your tongues. It is a source of discouragement to the forage plant breeder to see the farmers attach great significance to a variety of oats that will yield 10% more than another variety, but disregard a new grass variety that will produce 10% more hay of high quality, than the ordinary material commonly grown. Let us look at an example of what the use of one or all of the three good timothy varieties that are available would do for us. Apart from alfalfa our 1949 production of hay and clover was approximately three and one half million tons from about three million acres. I believe we can assume, very conservatively, that at least one half of this total was timothy, or one and three quarter million tons. The use of our superior varieties would increase this figure by at least 10% or 175,000 tons of hay per year. In 1949, at prevailing prices this increase would have a value in excess of $3,500,000 to Ontario farmers. This figure does not take into account improved hay quality and the effect these varieties would have on pasture production.

Your first question will probably be where can seed be obtained? It cannot be obtained at the present time, simply because there hasn't been an incentive for the production of pedigree seeds. The foundation stock seeds have been available, but the market for such seeds has not been established by grower demand. I am talking to you as a group of potential seed growers. You are, however, a potential market for pedigree seeds. In other words if you wish to produce and sell good seed stock you must be prepared to utilize them fully on your own farms.

Variety Conscious

If we can become variety conscious we can establish both a home and export market which will afford security for some time to come. You can be sure of the support of the institutions concerned with the multiplication of foundation stock seed and there is every reason to expect the whole hearted cooperation of the Canadian Seed Growers' Association and the seed trade on such a development. I do know that the widespread utilization of the varieties originated by the forage plant breeders would give new impetus to their work.

We come now to a consideration of the problems of forage seed production. Time will not permit me to go into detail, but a general review may be worthwhile. I would point out that growers interested in developing seed production over a period of years must be prepared for disappointments and difficulties not common to other cash crops. However, there would not appear to be major difficulties in the way of producing grass and clover seed. Alfalfa seed is an exception since with this crop seed set is so variable that production will probably remain on an incidental basis. We can and should be growing substantial amounts of timothy, meadow fescue, orchard grass, brome grass, reed canary grass, alsike, double cut red clover, ladino and white clover and probably birdsfoot trefoil. When available, recognized and productive varieties

should be used and production should be under registration from the Canadian Seed Growers Association or certification under the Plant Products Divsion of the Dominion Department of Agriculture. It is opportune at this point to express the opinion that the isolation requirements both for registration and certification should be revised so that the production of pedigree seeds can be carried out on a practical basis. The present regulations preclude the possibility of obtaining the necessary isolation on a great many farms where with more practical regulations good quality seed could be produced. It should be kept in mind, however, that a slackening of isolation requirements would make it more necessary than ever for the grower to revert frequently to foundation or elite stock seed to maintain the purity of his seed stocks.

In the production of seed of the grasses in this province there are two major factors dictating success or failure. These are soil fertility and the incidence of weeds. The grasses generally respond in increased seed yield to a high state of soil fertility. Given this coupled with the spring application of nitrogen, we can obtain profitable yields of seed. On the other hand grass seed production on average soil, in conjunction with proper fertilization, can bring about definite soil improvement and at the same time return a fair margin of profit. The extensive root development in meadows properly fertilized and used to produce seed makes a very great contribution to soil organic matter.

From a practical standpoint weeds constitute the major drawback to the production of grass seed. In timothy, weeds such as daisy and sheep sorrel make grading very difficult and frequently expensive. With the large seeded grasses such as brome, meadow fescue and orchard grass, couch grass will be the most troublesome weed. Areas infested with couch should be avoided for seed production of these grasses. The prevalence of "couch" throughout a farm need not, however, discourage seed production since the ridding of fields of this weed is a worthwhile project in itself. We have some evidence that a high percentage of the couch grass seeds found in grasses such as orchard grass is not viable. This is probably due to the fact that couch grass is a much later maturing grass than the large seeded grasses which we grow. If on further investigation this non-viability of early harvested couch grass seed is confirmed, it might be possible to interest the Plant Products Division in a study of the problem with a view to a mending the Seeds Act to take the factor into account. No-viability of hulled ragweed is at present taken into consideration in the grading of seed.

Legume seed production presents a wide range of problems. Any one of a number of factors have a direct bearing on seed set. Since our legume plants are largely self-sterile, cross-pollination between plants is necessary. This cross-pollination can only be brought about successfully by pollinating insects. By far the most important of these are the wild bees and the honey bees. There is one basic fact which we must accept. That is, pollinating insects must be present in sufficient numbers to bring about effective cross-pollination if a satisfactory seed set is to be obtained. The presence of large numbers of pollinating insects does not insure a legume seed crop, but we can take it for granted that if they are not present no other combination of favourable factors will bring about seed set.

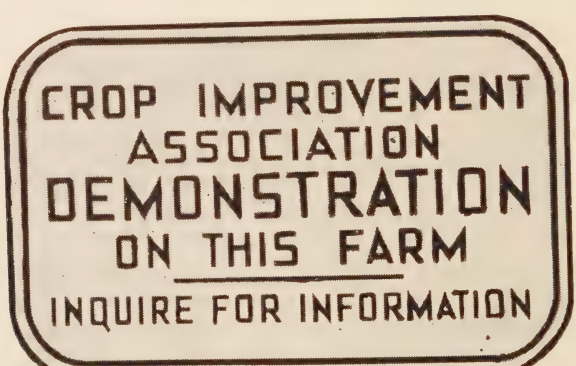
Honey Bees

The population of wild bees seems to vary widely from year to year and in different localities. While they make a major contribution we cannot be sure of their presence at any time or place. For this reason much importance has been attached to the role of the honey bees in pollination work. It has been established that their role can be a major one and their presence in fields of alsike, sweet clover, and ladino and white dutch clover is insurance that suitable pollinating agents are present. The legume seed grower should therefore use every means possible to populate his clover fields with honey bees. Indeed we may find it advisable in the future to pay bee keepers for the privilege of having them locate colonies in our fields. The present outlook with regard to honey production is gloomy and it appears that there may be a considerable reduction in bee populations in the immediate future. This situation, if it develops, could have an adverse effect on clover seed production. I feel we should buy the services of honey bees as we would other services and materials to aid in production.

Injurious insects are a serious menace to the clover seed crop. The use of chemicals should do much in the future to keep such insects as the aphid, grasshopper and various boring insects in check. At the present time the information on hand as to the usefulness of chemicals is far from conclusive, but some promising results have been obtained.

The management of clover fields intended for seed is important. Weed control, time of clipping, fertility, etc. all are important considerations. It is not possible for me to go into detail with regard to these factors. However, information is readily available to those who desire it.

I would like to offer the opinion that much greater attention should be given to our harvesting practices. There is ample evidence to show that harvesting losses run to very high figures. These losses can represent the margin between profit and loss. While I realize that it will not strike a happy note with you, I would like to suggest that the indiscriminate use of the combine accounts frequently for a great deal of this loss. The grower using a combine should make a careful study so that seed losses will be reduced to a minimum. Time of harvesting, method of combining and adjustment of the threshing and pick-up mechanism are important. The condition of the crop



will vary widely and the combine operator should be capable of adjusting his machinery to meet the requirements of the crop which he wishes to harvest.

In this talk I have attempted to give you a general picture of what is involved in grass and legume seed production. Much more might be said on varieties and the details of production but as I stated before that information is available when you want it. I feel there is a future in forage seed production for any group that wants to form a strong growers organization capable of carrying out a planned program for the multiplication of pedigree seeds.

GOOD CASH FROM POOR LAND

by Prof. R. G. Knox, Department of Animal Husbandry, Ontario Agricultural College

As has been intimated, the topic upon which I propose to offer some comment this afternoon is "Good Cash From Poor Land" — a rather intriguing title, I should say, and one which could suggest a certain amount of challenge and, at the same time, inspire serious thinking.

On different occasions, I have been privileged to discuss this problem which has to do with the bringing about of an increased carrying capacity per acre of all of our soils, at which times I have attempted to outline why, in my opinion, the undertaking of the solution of such a problem was warranted, when stress was placed upon the wisdom of attempting to reclaim the fertility of some at least of our so-called marginal soils, as well as to maintain the present fertility of our more productive soils.

The word conservation to-day is one which is being used to a considerable extent. There are many groups of people who are attempting to discover ways and means of bringing about the conservation of our natural resources in the true sense of the word. My topic to-day, I believe, could be associated to some extent at least with the true meaning of the word conservation, and I therefore beg to presume to do so. In using the word conservation in connection with deriving good cash from poor land, I choose to think of the word conservation as one meaning thrift. Furthermore, I do not consider that there are many kinds of conservation. As a matter of fact, there is only conservation and the lack of it. This is because nature is not a series of isolated systems but a single complex community, including man and all the animals and plants that may surround him.

When I speak of soil, I do not choose to consider that *land* is merely soil. It is the fountain of energy, flowing through a circuit of soils, plants and animals, with food chains as living channels conducting energy upward, with death and decay returning it to the soil.

To conserve is to save and protect, to leave what we ourselves enjoy in such good condition that others may also share the enjoyment. Conservation is the opposite of extravagance and wastefulness. It is an expression of good manners to nature and to our fellow men, including those of generations not yet born.

During recent weeks, one has heard the proclamations of many thinkers with respect to the ways and means by which it can be hoped that agriculture

in this country can be preserved and maintained in a status of profitable enterprise and not suffer from the frustrating world conditions that have already occurred, as well as those that have been prophesied.

Cash, meaning gold, naturally is the basis of consideration, and in the Province of Ontario the value of the live stock and live stock products, produced as we all know, amounts to a very considerable volume and the income from the sale of said products accounts for over seventy percent of the total agricultural income. The significance of this live stock is controlled by its ability to utilize and process the available forages, roughages, grains and by-products into an ultimate acceptable, edible product, acceptable not only to the domestic market, but to the export market where such may obtain, and the making available of by-products that serve to build and maintain the fertility of our soils.

Animal husbandmen as a group must be more thorough in the matter of of the integration of the findings of science and their application to the task ahead in animal production — the more efficient production in increasing amounts per acre of the protective food stuffs of animal origin. He must always have a complete appreciation and recognition of the other phases of Agriculture, not only with respect to their relationship to animal production, but to the progress and prosperity of all allied industry.

As I have stated before on more than one occasion, the degree of efficiency of a live stock unit is controlled to no small extent by the degree of efficient utilization of our lands and by the nature of the plants which may grow on them. With the ever increasing competition in the production and marketing of human food stuffs, there is a corresponding increasing challenge with respect to efficient land utilization.

On other occasions, I have made mention of the project which has been under way at the Ontario Agricultural College since 1945. It is expected that the majority of you are quite familiar with the undertaking, and therefore it is not my intention to encroach upon your time by reviewing the history of the project.

The summer of 1949 was the third grazing season. Whereas in 1947 and 1948 — 1947 in particular — seasonal conditions as related to growth were very favourable, 1949 was not so much so, since, as many of you are aware, the Guelph area was in the so-called drought area of Western Ontario. For purpose of emphasis, you are reminded that, whereas the normal rainfall for the months of May to September inclusive is 13.99 inches at Guelph, during 1949 the total precipitationf or the aforementioned months amounted to 9.11. Special mention could be made with respect to the significance of this reduced rainfall during the months of May and June, the two growing months, when the total rainfall for the two months was 1.29 inches, whereas the normal for these two months is 5.56 inches.

It will be appreciated that the effect of such a reduced amount of rainfall was not anticipated when, on May 9, sixteen yearling steers weighing 9,630 pounds were turned out on the twelve acres which had been treated earlier in the season with an application of 300 pounds of 2-12-6 fertilizer, at which time it looked very promising. There were certain times during the summer when one wondered whether or not it would be necessary to take them off. Actually, according to present day recommended methods of pasture man-

agement, they should have been taken off, but on the basis that this particular tract of land is representative of tens of thousands of acres in the pasture country where it would not be possible, in the majority of cases, to take the cattle off, it was decided to abuse the pasture for purpose of learning just how much gain could be obtained during the season.

For purpose of determining the carrying capacity per acre and valuing same, the sixteen yearling steers were put on pasture at 19c. a pound, the prevailing price of food feeders on the Toronto Market at that date. They were taken off on October 26, when they were valued at 18c. per pound, one cent per pound less than when they were put on as a result of a lower market. As a matter of fact, I was offered 20c. a pound for them by a drover for further feeding, but in fairness to the project, and in the belief that it is wise to be conservative in any conclusions, I decided to place the value at 18c.

Following is a statement relative to the pasture treatment and the summer's grazing results.

Cost of 1949 Treatment of Pasture

Harrowing, spreading fertilizer and clipping pasture	$ 9.60
300 lbs. fertilizer per acre at $1.78 per cwt.	64.08
Total cost of treatment of pasture	$ 73.68
Cost per acre of treatment of pasture	6.14

1949 Grazing Season

	Pounds
October 26 — Final weight of 16 steers	12,800
May 9 — Initial weight of 16 steers	9,630
Total gain on 12 acres	3,170
Average gain per steer in 170 days	198
Gain per steer per day	1.17
Gain per acre, 1949	264.1

Profit and Loss Statement—1949

Selling value, 12,800 lbs. at $18.00 per cwt. live weight	$2,304.00
Initial cost, 9,630 lbs. at 19.00 per cwt. live weight	1,829.70
Profit on 12 acres (treatment costs not deducted)	$ 474.30
Profit on 1 acre (treatment costs not deducted)	39.53
Net profit per acre (treatment costs deducted) ($39.53—$6.14)	33.39

The following summary of the three years grazing will no doubt be of interest to you.

Summary

	Pounds
Gain per acre — 1947	308
1948	219
1949	264
Total gain per acre for three grazing seasons	791
Cost per acre of treatment of pasture — 1945–47	$ 24.65
1948	18.48
1949	6.14
Total cost per acre of treatment of pasture for three grazing seasons	$ 49.27
Net profit per acre — 1947	$ 29.58
1948	68.81
1949	33.39
Total net profit per acre for three grazing seasons	$ 131.78

(Rent and interest on investment *not* included.)

Your attention is called to the fact that the result of an outlay of less than $50.00 per acre to date is that we have realized a net profit of $131.78, rent and interest on investment not included. But what is probably of greater significance from the standpoint of land utilization is the production of human food on a profitable basis from land that in 1945 had no carrying capacity worth mentioning. In total, the aforementioned land had produced forage that in turn brought about gains in steers to the amount of 791 pounds per acre on a treatment investment of less than $50.00 per acre. This is a point which I attempted to make when I addressed you last year: that there are thousands upon thousands of acres of so-called semi-marginal land that could be brought into production and used to financial advantage in connection with the use of our more productive lands.

Seven hundred and ninety-one pounds of beef per acre is not a fantastic accomplishment in any sense of the word. I am optimistic enough to suggest that, if we were doing it over again, we could increase the production to one thousand pounds per acre in three years. As a matter of fact, we have another ten acres similar in fertility seeded down at the College, which area has been subjected to a different treatment, and if the weather man is kind to us, it is expected that a report on the first-year's carrying capacity will be available next year.

Your attention is called to the fact that, in the three years, we have used 48 steers (36 yearlings and 12 two-year olds), with an average weight of 600 pounds (603 to be exact). May I take advantage of the title of my paper, "Good Cash From Poor Land," by asking you to exercise a little bit of imagination and do some mental arithmetic.

On the basis of the revised freight rates from Calgary to Guelph, namely $1.50 per hundredweight, the cost of the freight movement, plus the cost of feed and so on, at 15c. per hundredweight (a total of $1.65 per hundredweight) for the 48 steers that had an initial weight of 28,945 pounds would have been $475.20. These 48 steers have had a total gain of 9,497 pounds. On the basis of 6 pounds of mixed grain per pound of gain, there would have been required 28½ tons of grain to feed them. These cost of moving this train from Calgary to Guelph, with the $6.00 subsidy deducted, would amount to $207.41. You will agree that both of these expenditures have nothing to do with the purchase of the feed for the 48 head of cattle. They have to do with transportation only, and not the basic cost of feed. You are therefore asked to compare this total cost, subsidy deducted, namely $682.61, with the total cost of the re-seeding and treatment of the twelve acres of pasture, and are asked to arrive at your own decision with respect to the significance of the statement, "Good Cash From Poor Land."

Reclaiming Land

If you wish to think in terms of sound national economy, you will be obliged to agree that the $6.00 per ton subsidy is provided by the community at large, and it therefore should be taken into consideration with respect to the profitableness of reclaiming land and putting same into profitable production. On the basis of the subsidy being included in the cost of movement of grain, the amount paid out for transportation, commissions, etc. on grain moved from Calgary to Guelph would be $378.36, which, when added to the cost of the movement of the steers, would be $853.56, as opposed to a total cost of soil treatment, etc., of $591.24.

It is not my desire to appear as one who is provincial in his thinking, but I consider that one can rightly concern oneself with respect to the extent to which he is making use of his own individual inheritance, whether or not one's own property is providing maximum ways and means of providing security. On other occasions, I have seen fit to volunteer that, with an increased carrying capacity per acre of our semi-marginal lands, there could be a considerable increased volume of steers produced in Ontario. Mark you, I am thinking in terms of steers that would have a quality similar to the best of those of Western origin. I am not thinking in terms of the progeny of cow catchers. I continue to believe that it is possible to maintain through the reclamation of carrying capacity per acre of our so-called poor lands scores upon scores more of typey, breedy cow herds for the provision of feeder cattle within the boundaries of the Province of Ontario. In this connection, the twelve acres that have been used up to date for carrying steers will, I expect, be used for the purpose of checking its carrying capacity per acre in terms of cows and nursing calves in 1950.

It is sincerely hoped that this report has been of interest to you and that out of it some suggestions may arise that will prove to be helpful. As a matter of fact, it could be that the results obtained to date on this small acreage could serve to enable appreciation of the present program that we read now obtains in that great dairy and sheep country, New Zealand, which program involves the reseeding and fertilizing of not hundreds of acres, not thousands of acres, but millions of acres, when aeroplanes are used for the distribution of the seeds and fertilizers on the marginal lands of that country.

It is sincerely hoped that I have vindicated my assignment to some degree at least, and that I have indicated that it is possible to secure good cash from poor land, and what is still more important, to my way of thinking, that it is possible to produce in a very economical fashion highly desirable food on a profitable basis on so-called poor land—democratic conservation.

Courtesy of Farmer's Advocate

IT IS CROPS THEY ARE DISCUSSING.

From the left: J. W. MacRae, Fieldman, Crops, Seeds and Weeds Branch; M. C. McPhail, Principal, Kemptville Agricultural School; Dr. H. A. MacDonald, Associate Professor of Agronomy, Cornell University. All three were on the programme of the Eastern Ontario Crop Improvement Association Regional Conference at Kemptville on January 5 and 6.

GRASSLANDS IN OTHER LANDS

by J. R. Weir, Ph.D., Department of Field Husbandry
Ontario Agricultural College, Guelph, Ont.

THE old saying that "far away fields look green" becomes a practical statement after one has seen the pasture fields of Western Europe and the British Isles. A combination of favourable climatic conditions for good grass growth, and good management based on many years of practical experience and scientific research, has resulted in these excellent pastures.

Good climatic conditions are obtained by having cool weather through the growing season and sufficient well-distributed moisture in the form of gentle rains which does not run off but is held in the soil and is available for plant growth.

Under special conditions such as those found in the Netherlands the amount of moisture may be controlled by a very excellent system of ditches and canals.

The coolness of the climate, and particularly the adequate water supply permits an intensive system of fertilizing which gives a prolonged grazing season and heavy productivity. Much research is being done in order to find the most economical amounts of plant nutrients required and at what time, and in what sized increments, application should be made. It is interesting to note that the recommended and applied amounts of plant nutrients are much larger than we have been accustomed to use in this country.

The favourable conditions for grass and legume development have meant that much simpler hay and pasture mixtures might be used. In fact one grass species, Perennial Ryegrass, and one legume, White Clover, are the two main components of the major pasture areas except in the more severe climatic regions of Sweden and Norway. These areas do not have such a pressing problem as using only the hardiest varieties for winter survival, or the drought problem of our hot, dry mid-summer. The use of a single mixture such as one grass and one legume has meant that a much better adapted fertility and management program could be used. Better control could be kept over the natural growth habits of the ingredients of the mixture.

The conservation of fodder for use during the non-grazing winter months and periods of low productivity during the grazing season is an important consideration in almost every agricultural country. In certain areas conditions brought about by wars and the post-war recovery period has caused stimulated investigations along these lines. The conservation of forage crops in the form of sun cured hay was evident as one of the major methods in nearly all places. Grass silage has also been given much attention for this purpose in most areas. It permits harvesting the fodder during the various flush periods of growth and storing it as quite a satisfactory food. The flexibility of such a harvesting method permits a better control of the grazed pasture with the minimun loss, as excess growth may be harvested and stored at any time.

Considerable work was also being done on the artificial drying of grass and legumes. While most workers recognized the excellent quality of the product if managed properly they were all agreed that the expense involved was very large for the average farmer. It cost almost twice as much under British conditions to conserve the same amount of nutrients by artificial drying

as by grass silage. Further research work is needed in respect to this method of fodder conservation.

Some of the observations described above will be presented in illustrated form by Koda slides. It must be stressed emphatically that the information presented depends largely upon the conditions of the countries where it was obtained. It is dangerous practice to attempt to transfer methods and techniques from one country to another without proper testing where they are to be used. Climatic and environmental conditions so greatly affect the successful operation of these practices.

In conclusion it is only proper to stress the great importance that these high producing excellent agricultural countries place on a research program with regard to pasture improvement. Where food production in relation to quality is of paramount importance and where the producing power of the soil must be maintained and increased, grass and legume research is given top priority.

MY FARM PROGRAM IS BASED ON BETTER PASTURES

by A. G. Murray, Wilton Grove, Ont.

I KNOW that our pasture program is far from perfect yet. However, I am satisfied that pasture improvement has been profitable to us in our cropping program and in the milk production of our dairy herd.

Our first experience with the now prevalent "permanent" or long term pasture was in 1943 when we seeded eleven acres in right next to the barn with a "Greenlands Pasture Mixture." This field was fertilized and the seed sown without a nurse crop. In spite of a late spring and very poor starting conditions, a good stand was obtained and considerable grazing provided the first year. The following year an adjoining field of seven acres was seeded to another commercial mixture and a fairly good stand resulted. The eleven acre field was divided into seven strips and the seven acre into two pieces by electric fences. This eighteen acres has remained in pasture until this fall when we broke up the smaller field which will be replaced by eight acres seeded last spring.

Our milking herd consists of from 30 to 35 cows and 18 acres has proven to be about about the right acreage for that many cows. Because there is considerable orchard grass in the mixture, we are able to turn them out at least a week earlier than we could formerly onto alfalfa or sweet clover pastures. From the time they go out until second crop alfalfa is ready about the middle of July we have always had ample pasture for our cows and a few times have had to take off some clippings to keep it from getting ahead of them. From the time our hay aftermath is ready until about the middle of September, we depend mainly on the hay fields, though they may have some time on the permanent pasture fields if growth is good and then we are able to cut some second crop alfalfa. For our hay mixture for several years now we have been using about 10 pounds of alfalfa, 1 or 2 of timothy and 5 or 6 of brome grass, leaving it down for two years. We like brome very much in the hay fields. It keeps growing all summer, the cows like it and it minimizes the possibility of bloat with alfalfa. It gives a softer more platable hay than timothy and while it is a little slower to establish, it gives a good yield the second year, particularly in a dry season such as we had this last summer.

The permanent pasture fields then provide good pasturage through the fall months and an application of ammonium nitrate in the summer will give good returns later in the season.

The management of these pastures is important if the best returns are are to be obtained. We clip them several times to keep the bunches and any uneaten patches from getting coarse, and harrow occasionally with a lever adjusting harrow set flat to spread the droppings. We make it a practice to manure them every second fall or early winter. In between they have had several applications of commercial fertilizer at about 200 pounds to the acre. I believe now that heavier applications might be profitable because it does seem as if you cannot get land too rich for pasture and certainly a lot of nutrients are being removed from these fields in milk.

We like the plan of dividing the fields into fairly small plots for rotational grazing. This cuts down waste from tramping, gives more uniform grazing and keeps the cows in fresh pasture all the time. It is surprising how the cows

learn to look for a new field every day or two. In fact it can get to almost a nuisance because they do not want to go back in a strip a second time sometimes. We have eliminated many of the fences between our other fields making them larger and easier to work in other crops. Then when we want to pasture our hay fields we divide them into smaller sections with electric fences and again keep the cows on fresh grass frequently.

Then, too, we have on the farm considerable acreage of old bluegrass-timothy pasture, part of which is land which has never been broken. This provides pasture for dry cows, young cattle and the sheep. For some years we have realized that this has not been producing anything like it should. Consequently this fall we broke up 10 acres of the virgin land, using an 18-inch one furrow cornstalk plow which did a very good job of breaking this land which was very rough with cradle knolls. It was then levelled with discs and a section of railroad iron. In the spring we will fertilize it heavily—because soil tests have proved it to be badly run down—and seed it to a mixture of grasses and the new legume "Birdsfoot trefoil" which we are anxious to try out. Then we will break up another part for seeding the next year. We believe that with this program we will be able to provide more pasture and better pasture off a smaller acreage and release some of the land for other crops.

I spoke of sheep a minute ago. Our small flock of about 40 ewes is a profitable sideline and I feel is worthy of mention in this talk because they do a grand job of controlling goldenrod and wild carrot and preventing thorn bushes and becoming established in the pasture. They go through the winter on hay only, fed in an open shed. They start to lamb the first of May and the lambs are all gone before Christmas. Very little labour is involved and they give a good return on the investment. I believe there should be more farm flocks of sheep in Ontario.

In conclusion, I would say that these improved pastures have been the biggest forward step in our farm program for many years. Pastures and grass production have been and still are the weakest links in farm production in Ontario and I feel that everything possible in an educational manner should be done to encourage farmers to improve their pastures for more economical production.

MY FARM PROGRAM IS BASED ON BETTER PASTURE

by Alex Muir, Woodstock, Ont.

I WONDERED what I could say about better pasture that would be of interest to anyone when I was asked to speak on this subject, as we have had a wealth of information on better pastures presented by the O.A.C., the Department of Agriculture, the press, the radio and Audio vision during the past few years.

We notice that improved pasture programs are more the exception than the rule as we travel across our country. We will be more prosperous when this picture is reversed, so it is still necessary to encourage a Better Pasture Program.

I cannot possibly go into detail in the few minutes alloted to me and I am not going to burden you with any figures, just a little story.

We consider ourselves principally interested in dairying as most of you know. You are also aware that our young cattle are pastured away from

home on property rented annually because we have not been able to purchase such property; this does not lend itself to an improved pasture program.

We try to pacify our Happy Holsteins during the pasture season with the cheapest food we know of, namely juicy, luscious pasture in order to obtain the most economical milk production from them. Besides being the cheapest feed, we soon realized that better pasture is a labor saver, because it is usually available when average pasture is bare and burnt by hot sun. That eliminates the necessity of supplements with more expensive feeds, especially when one is extra busy harvesting other crops. We hasten to admit we do not always succeed but we try our best and realize we will always have a lot to learn.

We believe we need a soil with super fertility and good drainage, one with a high humus content has a higher water-holding capacity. We also need sufficient moisture, a suitable seed mixture and constant management.

No doubt many wonder what I have in mind when I say a suitable seed mixture. It is futile to dwell on this factor with so much information available for various conditions. Our ideas may not suit many others.

Orchard Grass

I do want to give credit to the Orchard Grass for the part it plays in our seed mixture; if there is a better pasture plant, then I would appreciate knowing about it. I realize that many will not agree with me and still consider Orchard Grass as a weed. I do not advise you to try this great economizer, personally, unless you are prepared to manage him. Give him fertility, moisture and temperature and he will keep you on the jump to keep him under control. He will grow an inch each day and produce juicy, luscious leaves that the cattle will devour, providing he does not get over 6 to 8 inches tall.

You have to be ready to chop him down if he starts to run away, and brother, is it fun to put the tractor in 4th gear and idle the mower over the pasture, chopping off Joe Orchard Grass. The cows come along and devour him or he lays there and covers the ground, holding the moisture and protecting the roots of the mother plant from the burning rays of the hot summer sun.

Orchard is one of our earlest grasses in the spring and under suitable conditions will grow right through to freeze up. We noticed it was even growing during the mild spell in the early part of this unusual January of 1950.

Maybe you feel I have given my pet too much of a build up, and I know some of our authorities have no love for Joe Orchard Grass. I want to say he has yielded head and shoulders over anything we have used in a better pasture mixture.

He has one bad habit, in that he is not too compatable, he squeezes other grasses and clovers out of our fields; this does not worry us very much because we try to keep most of our fields in a regular 4 or 5 year rotation. We are willing to admit that we might take Joe Orchard Grass out of top place in our estimation if one of the other grasses which we are continually trying, prove to be superior.

A new grass must do more than produce better pasture. In addition to being an ideal pasture grass, a new grass must be a humus builder for the soil that is where Joe Orchard Grass outshines any other useful grass which we have tried.

You are well aware that much of our Ontario soil is low in humus. (That ingredient which makes the soil dark, loose and friable with a high moisture and fertility holding capacity.)

High humus soil is the most productive type for better pasture or any other crop. Yes, a highly productive soil is the best bank account a farmer can have, one on which there is no income tax.

Sentimentality

The more land you can have in Better Hay and Pasture the easier it is to keep your farm at home. Yes, we are sentimental about our farms, they are our homes and our businesses. If we do not keep them producing Better and More Hay and Pasture and prevent erosion and leaching, they will gradually run down the rivers to the seas and leave us — desolate!

I feel I should sound a word of warning in case you think Better Pastures are an easy "cure-all" for our economic plight as the prices of many things we sell are going down and costs are constant or rising.

Better Pastures cost money — it costs money to build up soil fertility — grass and clover seeds cost money — so do fencing and management, but the harvesting is *ideal*. Yes, you have to be prepared for a fairly large investment per acre, but from the standpoint of a livestock farmer Better Pasture is one of the best ways to counteract the economic squeeze!

Ladies and Gentlemen, those are a few major reasons why My Farm Program is based on Better Pasture, and it is all summed up in that excellent motto which won the $100.00 prize at Canada's first Grassland Day held only three years ago in Oxford County. The motto is "Grassland is Cashland."

Hay balers are on the increase.

SOILS IN RELATION TO CROP PRODUCTION

by **Dr. F. A. Stinson,**
Department of Soils, O.A.C., Guelph

Obviously the relation of soils to Crop Production is close; equally close is the relation of cropping to soil productivity; its development, utilization and maintenance.

Perhaps we would do well, in the time available, to consider some aspects of this inseparable relationship between crops and soils.

The extent and variation of soil conditions and crops employed in Ontario limits our discussion to general principles rather than specific relationships such as one might consider where only one crop and a comparatively narrow range of soil conditions is involved.

For the sake of being systematic, suppose we dwell on the physical or mechanical condition, which includes the whole question of water and air relations in the soil; and relate it to the chemical or plant nutrient aspect of soil productivity referring as we go along to the very important matter of living things in the soil which is spoken of as the biological factor. Each of these may be of equal importance since weakness in any one may result in failure to produce economically. Furthermore, they depend on one another and attempts to improve crops by changing one, are not successful if the others are out of line.

So that we may be thinking somewhat similarly, I suggest that we think of some of the things that affect the crops produced on a certain acre of land from year to year. Each of us now, no doubt has in mind a different crop on a different acre, but as long as we stick to that particular acre, we are at least within the same dimensions. To further orient our thinking, let us keep in mind that, for growth the crop requires from the soil its supply of water and more than a dozen elements including nitrogen, phosphorus, potassium, calcium, sulfur, magnesium and so forth. In order that the roots may grow extensively and be enabled to contact and take in the water and required elements the soil must be suitably aerated.

Roots Suffocate

The answer to one or two questions regarding crop effects frequently observed, may serve to illustrate the effects of air and water in plant growth.

Why do many crops die when they are flooded for an extended length of time? It has been shown that the roots of such crops suffocate from lack of fresh air. Why do they turn yellow and sickly in appearance during prolonged wet weather in the spring? That again is the result of lack of fresh air in the soil. Why do plants wilt and cease to grow during severe droughts? Obviously that results from shortage of water in the part of the soil occupied by the roots.

Owing to the apparent importance of this question of air and water in the soil, it may be well to examine it a little more closely. A soil consists of solid particles between which are spaces commonly known as pores. These are filled with either water or air. Under ideal conditions for plant growth, half the volume of soil in the rooting area would be occupied by solid material while the other half would be filled with water and air in equal amounts by

volume. When soils are flooded the pores contain too much water at the expense of air, whereas under drought conditions air takes the place of water. The sizes of the pores are, of course, dependent on the size of the soil particles. Sands being coarser have a larger proportion of big pores than clays in which the majority of the particles are very fine. Water drains out of the big pores more readily so that normally sands tend to be well aerated and are more droughty than heavier soils. Lack of aeration and poor drainage are, as would be expected, more likely to present problems in the heavier soils. May I take this opportunity to say that in my opinion the subject of physical properties in Ontario soils has not received either the consideration or the study it deserves. I venture to say that whenever qualified personnel and facilities are available to investigate the failing yields of our agricultural crops, a good share of the answers will be found through the application of measurements made on physical properties of the soil.

Now getting back to that acre of crop on which we had fixed our minds. What factor is likely to affect its production to the greatest extent? Under the vast majority of conditions that factor is the supply of water in the soil; and since water and air occupy the same spaces interchangeably, soil water and soil air can scarcely be considered separately. Aeration is more critical for some crops than others, for instance tobacco and potatoes require well aerated soils; they will not stand flooding at all, whereas Reed canary grass can tolerate several weeks of flooding without apparent damage. This question of relative soil air capacity required by different crops has not been studied extensively and a great deal more factual information is needed on the subject in order to adapt crops to soils adequately.

If the soil is poorly drained, seeding may be delayed or even prevented. Too much water, with too little soil air, will restrict root growth, and hence may seriously limit the amount of soil from which the crop may get its supply of elements and water throughout the season. Except when the soil is quite wet, water and plant food do not move about; if the plant is going to get them, the roots have to grow into the region where they are. With such a short growing season as there is in Ontario, droughts of even short duration have a relatively big influence on crop production. At some time or other during the growing season there is usually a period when rainfall is too scanty for best growth; if the roots are not well enough developed to get the additional requirements from that stored in the soil the yield is reduced. Here again problems of soil drainage are complicated and the need for controlled experiments to yield information on the effectiveness of different drainage systems for different soils is urgent.

Since the chief source of moisture in the growing season is from rainfall, it is of interest to think about what happens to rain when it falls on the land during that time. Three things can happen. It can soak in, run off, or evaporate. Whether rainfall soaks in depends on the amount of water in the soil, the covering and the number of large pores on the surface, through which it may enter. We have noted already that sands frequently contain too many large pores while clays often have too few of these big ones capable of transporting water. This raises the question as to what can be done to correct the situation.

Water Movement

Actually the system of management of a soil has a very decided effect on its ability to absorb water, to permit water to drain through it, or to be held

where it may be available for crops. The movement of water and air in the soil is closely related to tilth and any practice which improves tilth also improves the water — air relations for crop growth.

One of the most important phases of conservation to prevent soil erosion is contour plowing. Here students are carrying out a contour plowing scheme under direction of experts in the Agricultural Engineering Department at the Ontario Agricultural College, Guelph. The picture was caught by a camera man during a students' plowing match near the college on October 21.

When suitable organic material such as barnyard manure, green manure, straw, cornstalks or leaves is returned to well aerated, moist land in which there is a supply of lime and other fertility elements the soil organisms, including fishworms, feed on it and in the process cement the fine particles of clay together into large granules or aggregates. This increases the size of pores in clays and makes such soils more open and porous. In a sand the fine particles are not as abundant and organic matter additions tend to hold them together, increasing their water-holding capacity, partly by filling in the large pores and partly by acting like a sponge. Rain falling on a bare soil breaks up soil aggregates; the fine particles that result plug up the pores and interfere with the entrance of water and air. The action of cultivators and discs in ordinary tillage also destroys aggregation, permits more rapid loss of humus and results in poorer soil tilth.

Each of us is familiar with the crumblike structure or granulated condition of a loam or heavier soil when it is first broken out of sod, as contrasted with the powdery condition after two or more years of annual crops. Soil aggregation and permeability has been studied in a preliminary way by the Department of Soils at the College. Comparisons showed that water soaked into a soil that had been in sod, five times as fast as it did into the same type of soil that had been cultivated for a few years. Similarly water drained through a clay loam from under sod readily, while it was often necessary to wait hours to get even a few drops through when the same kind of soil was taken from a field that had been in cultivated crops for some time. In a preliminary in-

vestigation carried out in the Soils Department, it was found that a loam under an old grass sod was 96 percent aggregated. One crop of oats reduced the aggregation to nearly 50 per cent. Similar studies elsewhere reveal that under a cultivated crop like corn the reduction in aggregation is even greater than for oats. Continuing the study of aggregation, it was found that under a two-year and four-year old sod the soils were aggregated to the same extent, just 15 per cent lower than under the long-term sod. This indicates the possibility of improving the structure of soil by including two consecutive years of sod in the rotation.

Why has alfalfa proved so much better for preventing water from running off a slope than annual crops? Not only do its closed growing stems slow down the rate of flow of water, but it also protects the soil surface, and provides favourable conditions for aggregation of the fine particles into larger ones. There are many reports to indicate that deep rooted legumes, such as sweet clover and alfalfa, are useful not only for improving the tilth of the topsoil, but also that they have a beneficial effect by opening up subsoils that are either naturally impervious to water or have become so by packing with heavy machinery.

Perhaps we should consider what happens when water does not soak into the soil but runs off. Here again the answers are by no means all known and controlled studies represent a real need. One of the most obvious things that water does, is to carry soil with it. The more water runs off, the more soil it takes. The finer the soil particles, the more the water can carry. A sand or a soil that is well aggregated will not be damaged to the same extent as a clay in which the organic matter is low and in which the aggregates have been destroyed during cropping. Studies in connection with soil runoff have shown that the portion of the soil washed away is richer in humus and plant food than that which is left. Among that remaining are the stones. Those of us who have picked stones, know that the most of them show up in the sharp knolls and the face of hills; not on the level areas. It was long believed that the frost brought the stones to the surface. There is little to support that theory. The more reasonable one is that loss of soil from the slopes lowers the surface of the land enough to permit farm implements to catch on the stones. The implication is, therefore, that if water could be prevented from carrying off the soil stone picking would cease to be a regular farm operation.

The growing of crops adapted to various types of soil, the selection of varieties and strains suited to different soils, climatic regions, and purposes, and the wise use of commercial fertilizers, are each important in the matter of crop production. The effectiveness of each of these in improving production is conditioned by the extent to which satisfactory tilth is maintained and how adequately is handled the conservation of needed water, and the disposal of the excess. Those factors which will result in increased yeilds of crops contribute to the maintenance of soil tilth by permitting more crop residue, barnyard manure and green manures to be returned to the land.

Increased acre yields, brought about by adoption of better practices, should permit keeping more land in the soil-improving sod crops for a greater proportion of the time.

One of the main reasons that livestock systems of farming have in the past been most effective in improving and prolonging the usefulness of our soils

is that they include a high ratio of sod crops to cultivated crops. Another reason is that the sale of organic matter and fertility elements per acre is lower when livestock products are sold than when cash crops such as grain, potatoes and tobacco are marketed.

In summarizing; it sppears that the use of sod crops including alfalfa and clovers is an effective means of restoring the tilth of cultivated soils and thereby improving and prolonging their usefulness for crop production. On some soils, drainage, liming and fertilization are required to grow these crops satisfactorily. Not only the growing, but also the plowing under of legumes is needed to restore and maintain satisfactory productivity under many of our soil and cropping conditions. By making the land fit to grow these crops of legumes and grasses well, and by growing them to feed livestock and to plow under, a great deal can be done toward restoring and maintaining the soil for crop production.

Arthur H. Martin, Director of the Crops, Seeds and Weeds Branch, Ontario Department of Agriculture, is shown, (left) receiving from Hugh McKenzie, an award of merit. The award is made annually by the Canadian Barley Improvement Institute. Presentation was made at a dinner-meeting in the King Edward Hotel. The award states that it is made "in recognition of outstanding contribution toward improving the quality of barley grown in Canada."

ULSTER SUPREME

Katahdin, the well known American potato is one of the parents, the other being Dunbar Standard, of the new variety named Ulster Supreme, which has given such outstanding results to potato growers in England during the past two seasons that it has been awarded a gold medal. It is of midseason maturity, producing oval tubers with white skin and flesh, and shallow to medium eyes.

LIME IN RELATION TO CROP PRODUCTION

by A. Gordon Skinner, Agricultural Representative
Haldimand County

THE application of soil amendments is by no means a new idea and history has recorded many tales of its effect upon the peoples of the world in times gone by. Reference to the use of lime in particular was made in literature written before the birth of Christ, and Creacy in his description of the battle of Marathon tells of a small body of 11,000 Athenians, brought up on lime-rich food and water dealing effectively with an enemy ten times stronger but coming from an area less fortunate in lime supply. According to the story the limestone fed folk lost 192 of their 11,000 while the enemy left 6,400 dead on the field of battle and had seven ships burned.

While this may be a rather dramatic presentation of the value of lime in our daily lives, it serves to show how highly it was regarded even in those days. We may not have any such striking example to offer to-day and in a sense we may not regard lime in quite the same light as in olden times although there is still much to commend it to our use in the balancing of our soils.

Right here I would like to disabuse your minds of any idea you may have that I am "hipped" on the subject or somewhat in the nature of a "crackpot." Such is certainly not the case, for while I believe that lime is *one* of the essentials in our modern day farming practice, it is still only one and we must view its use in the right perspective. Important as it is, it is still only one link in the chain of "Better Farming." When we look at it in that light and fully understand its value and use in relation to the other factors, we will have the proper approach to the subject.

One of the first things we have to keep in mind is that lime is chiefly a soil amendment. While it is true that lime is removed from the soil through crop production it cannot replace commercial fertilizer, but it does increase the efficiency of that fertilizer when the soil is in need of lime. Every year we have a number of farmers ask the question, "If I lime my soil do I have to apply fertilizer too?" This is like asking the question, "If I give a cow water do I have to feed her as well?" The one does not replace the other and yet it does have a very direct bearing on the assimilation and use that is made of the other. Lime does not take the place of commercial fertilizer, and yet its presence in the soil does have a great deal to do with the availability and utilization of the plant food in the soil. Soil scientists tell us that when soils are acid or in other words, are in need of lime, the phosphorous is locked up in unavailable forms by the acid radicals, almost as fast as it is applied. On the other hand, when agricultural lime is applied, these acid radicals having a great affinity for lime, are neutralized allowing the applied phosphorous to remain in forms that are more readily available to the growing crop, thereby increasing the efficiency of the fertilizer. This is one of the significant values of lime in those parts of Ontario where great areas of so-called "acid-soil" exist.

Soil Acidity

This correction of soil acidity is one of the important functions of lime—in fact it may almost be considered the most important, expecially in those acid soil areas where it is desired to grow crops not tolerant to acid conditions. The pH value of a soil or in other words the degree of acidity or alkalinity

developed in a soil will have a direct bearing on the type of crops that will grow to advantage in that soil. Sweet clover might be offered as an example of a lime loving crop. Indeed this crop may even be looked upon as an indicator crop, since one of the first things that should be checked when the crop will not grow is the soil reaction or pH value. Of the field crops at the other end of the scale is rye, which is quite tolerant to acid conditions and will thrive under conditions where many of our commercially grown economic farm crops would not do well. As a matter of fact, most of our well known farm crops will grow best on soils that are neutral or only slightly acid in reaction. This is particularly true of the soil building clovers such as alfalfa and red clover in addition to sweet clover. Indeed these legumes may be looked upon as the basis of any sound soil improvement program, because of their ability to take the free nitrogen of the air and store it in the soil as well as their capacity for growing bulk to plow under and add the much needed humus or organic matter to the soil. Since these highly important crops will not grow and function properly unless lime is present in liberal amounts, lime and its use may reasonably be considered as the key to soil improvement.

As intimated earlier, lime is removed from the soil through crop production and here we have another of its functions, and that is the supplying of important minerals such as calcium and magnesium to our crops. Many soils were acid to start with and Haldimand clay is one of the best examples of this, and with cultivation they have become more acid unless lime has been applied. The more intensive the cultivation, the more rapid has been the increase in acidity, largely because of the removal of calcium as part of the crop growth. Take alfalfa for example, every ton of this crop removed 85 pounds of lime. Likewise, every ton of red clover takes 75 pounds of lime with it. Similarly other crops remove either calcium or magnesium in varying amounts. It stands to reason that those fields that have been producing heavy crops of legumes rich in minerals for probably a century, have removed much of any reserve that may have been in the soil and if there was no reserve there, then the crops have been deficient in these elements. In turn the live stock fed on such crops are likely to be deficient in these self same elements and we have the beginning of a vicious circle.

Closely associated with this question of growing legumes and their faculty to catch some of the free nitrogen of the air and store it in the soil, is the inoculation of the clovers with legume bacteria and the provision of optimum conditions for the development of those bacteria. It is a fact that although these nodule-forming nitrogen-gathering bacteria will live and thrive for many years in a well-limed soil, they die rather rapidly in acid soil. When these nodules do not form on the roots, the legume is forced to take all of its nitrogen from the soil and instead of it being a soil building crop it immediately become a soil depleting crop. The moral, naturally, is to see that the soil is well supplied with lime, and the legume seed inoculated.

Another thing that lime does is to aid in improving soil structure and soil structure is one of the most neglected of the farm management problems of the day. It has been clearly shown in recent research work in soil and water conservation that obth the capacity of soil to absorb or soak up water and its ability to resist erosion, are determined to a large extent by its structure. Lime in addition to assisting with the production of heavy yielding soil building crops which do so much to improve the tilth of the soil also has the effect of

making a heavy clay soil more open and friable, easier to work in other words, and at the same time it will also tend to bind a more open sandy soil together so it will have a greater water and soil fertility holding capacity. This is extremely important to us in Haldimand County where we have our share of heavy clay. This loosening action makes the soil more porous and granular and permits air to circulate through the soil more freely in addition to permitting of better drainage. The net result is that the soil is not nearly so apt to puddle when wet or cake when dry. In a practical application of this theory the Rothamstead Experiment Station in England found that ten well limed acres of heavy clay soil could be plowed in approximately the same time as eight unlimed acres of the same soil with less wear and tear on the equipment.

A good business for at least two parties — the farmer and the operator.

One could continue to enumerate the benefits to be derived from the application of lime but time will not permit. Suffice it to say that lime may truly be called the foundation of soil fertility, but we must remember that it is not complete in itself. We may start with lime, but we cannot end there. There are other links in the chain such as the replenishment of the organic matter, adequate use of fertilizers and manures, crop rotation, control of erosion, etc., etc. The adequate use of lime will increase the effectiveness of these other factors.

Does it pay to use lime? This is a very imporant question. No matter how important the use of lime may be, our time would be wasted if the practice was not economically sound. Prof. Norman J. Thomas of the Department of Soils, at the Ontario Agricultural College, kept very accurate figures on a project conducted on heavy clay soil which was strongly acid in reaction. Using a rotation of wheat, mixed hay, corn, oats, and sweet clover hay and applying two tons of agricultural lime per acre, once in a ten year period it

was found that the legume hays gave the largest returns from the lime, followed by oats, corn and wheat. Evidently the residual effect of the legumes through increased nitrogen was beneficial to the grain and corn crops. By giving the then current values to the various crops, Prof. Thomas found that the gross value per acre of all the crops in rotation of 5 years would amount to $206.60 on the limed plots and $174.21 on the unlimed plots. This resolved itself into a difference of $32.49 for the 5 years or $6.48 per acre per year. However, as stated, the lime was only applied once in 10 years and the full cost should therefore be spread over a ten year period. It was estimated that it cost $8.00 per acre to apply the two tons or an annual cost of 80 cents per acre. This left a net increase of $5.68 per acre.

Lime Valuable

Evidently our farmers are finding it to their advantage to apply lime for there has been a tremendous increase in its use during the past few years. Take Haldimand for example — during the calendar year just closed our office has issued permits under the Agricultural Limestone Subvention Policy during each of the 12 months, and covering almost 3,900 tons. This is greatly in excess of any previous year. As an example of the increase we might cite the figures for August, the peak month. During this month last year we issued permits to 69 farmers covering 1573 tons. In August, 1948 there were 40 permits covering 776 tons and in 1947 the figures were 17 permits covering less than 300 tons.

Perhaps you would like to know if our farmers are actually receiving any returns from the application of this material. This can best be done by telling you of the results obtained by a few of our farmers who have come forward voluntarily to tell us of their experience. For example, let us first mention the case of Mr. Lawrence Hagen of Seneca Township. Mr. Hagan has one 12 acre field on which he has never had a good catch of alfalfa during the 30 years he has been on the farm. In reality he has never even had a poor catch for in most instances it has been a complete failure although he has occasionally had a fair to good catch of red clover. In the fall of 1945 he sowed three bushels of alfalfa costing $75.00 on this field and while he got good catches on other fields he had little or nothing on this field. During the fall of 1948 and as a result of hearing others talking about sowing lime, Mr. Hagan treated this field at the rate of one ton to the acre. Last spring, that is 1949, after seeding his other fields he had approximately 30 pounds of alfalfa seed left over and sort of half heartedly and rather reluctantly he sowed the 30 pounds on two acres of this field with the balance being put down with red clover. Somewhat to his amazement, he has a good catch of alfalfa on the two acre plot, as good, if not better than he has anywhere else on the farm. The lime for the twelve acres cost him approximately $41.00 applied to the soil.

Then there is the case of Mr. John M. Vokes, who lives near Nanticoke. Mr. Vokes has gone into the liming business in a rather large way, having covered his whole farm with 167 tons since the fall of 1947. Recently he secured a permit to start all over again. His comment was, that whereas he had very poor catches before applying lime, he is now getting good catches regardless of weather conditions. This seems to be one of the bonus results of applying lime in that where it is used the crops do not seem to be subject to the vagaries of the weather to the same extent that they were previously. Mr. Vokes cited the example of two, eight acre fields. One was plowed out of corn stubble in

the fall of 1946 and seeded to oats and alfalfa in the spring of 1947. In September of that year he decided to lime this field, even on the new seeding, a practice which is not altogether recommended if we are to get the best results from the lime. Field No. 2 was plowed out of wheat stubble in the fall of 1946 and was sown to oats and alfalfa in the same manner as field No. 1, but no lime was applied that year.

The interesting part is a comparison of the yields of these two fields in 1948. From field No. 1, which had been limed, Mr. Vokes harvested 17 loads of good hay. On field No. 2 he had eight loads. Practically the same results were obtained in 1949. Again he cut 17 loads in the first cutting and 8 loads from five acres in the second cutting. Field No. 2 gave a yield similar to what it did in 1948.

Mr. Vokes also seems to have found a method of beating the pasture shortage. During 1947 he limed a six acre field. In 1948 he applied 20 per cent superphosphate at the rate of 500 pounds per acre along with a light coating of manure at about 5 tons to the acre. By good rotational management and the dividing of the six acre field into thee parts, Mr. Vokes has been able to maintain his herd of 25 head of cattle and two horses without pasture shortage; this in a year when many farmers were at their wits end to know what to do. All of this cannot be credited to lime, but no doubt lime did have something to do with maintaining a proper balance in the soil and in permitting the legumes to grow and develop as they should.

These examples are not confined to Haldimand County. There is the case of Jim Moore of Woodhouse Township over in the neighbouring county of Norfolk. Mr. Moore discovered that where road gravel had been drawn across his field the alfalfa grew considerably better than elsewhere in the field. He soon discovered that it was the lime in the gravel that was making the difference. As a result of this observation, he applied a ton and a half of lime to the acre on the whole of the seven acre field. He was amazed at the increase in yield that he obtained. For instance he harvested 13 loads of high quality second cutting alfalfa off this field this past season and the crop was up to the knees for the third cutting.

These are only three cases of dozens that could be cited. The fact remains that farmers must be getting results or they would not continue to buy lime in such increasing quantities.

Not all soils need lime and in fact in some instances the application of lime might even be harmful. It is therefore strongly recommended that the soil be tested before any lime is applied. If such a test is made and lime is needed, it will give an indication as to how much should be applied. If on the other hand it is not needed, it avoids wasted effort in putting it on. However, as has been previously intimated and even on soils that were originally plentifully supplied with lime, a century or more of continuous cropping together with the losses caused by leaching have greatly reduced the potential and it is time that Ontario farmers were checking their lime levels carefully.

"A limestone country is a rich country" is a time-honoured truth which has resulted from the benefits derived during years of experience. A soil plentifully supplied with lime makes for the easy production of bumper crops of legumes and the accumulation of atmospheric nitrogen in the soil. It makes for faster growing, large boned animals because of the bountiful supply of

calcium in the feed taken up from the soil. All of this is reflected in larger herds on smaller acreages with a consequent reduction in the cost per unit of production. This, in turn, makes for a prosperous agriculture.

THE USE OF AGRICULTURAL LIMESTONE IN ONTARIO

by A. H. Martin, Director, Crops, Seeds and Weeds Branch, Ontario Department of Agriculture, Toronto

LIMESTONE is a rock consisting essentially of calcium carbonate or its equivalent in magnesium carbonate. When a magnesium limestone rock contains 30 per cent or more magnesium carbonate it is known as delormate. We have large deposits of both calcium carbonate and magnesium carbonate rock in Ontario.

Limestone has many uses, such as road construction and masonry, in the manufacture of iron and steel, burned and hydrated lime for mortar plaster, cement, glass, paper and mineral wool. It is used in mineral feeds and industrial fillers as a corrective in the soil.

References to soil liming are to be found in literature written before the birth of Christ. European farmers have limed their soils for many centuries. In 1911, United States farmers used less than 200,000 tons of limestone on their soils. Now they are using 28 million tons. For many years some Ontario farmers have spread marl or land plaster on the soil with good results. In 1942, less than 3,000 tons of ground limestone were used. In 1947, this had increased to 14,000 tons. In 1948 the total tonnage for agricultural purposes amounted to 23,350 tons and this year from April 1 to December 31, 3,000 tons have been distributed.

Plant Nutrients

All crops utilize calcium and magnesium as plant nutrients. The amounts consumed vary widely with crops. Grain crops use much less than grasses and legumes. A crop of wheat for instance uses 10 to 15 pounds per acre, but a crop of alfalfa hay uses 200 to 250 pounds. Probably greater quantities are lost through leaching and erosion. Generally speaking, most soils located in areas where the rainfall exceeds 20 inches require lime. This is not exactly true of the province of Ontario. There are still large areas where only a farm or a field here and there requires lime. Surveys indicate, however, that "lime poor" areas are increasing and now roughly include the Niagara Penninsula, along the Lake Erie shore, Essex County, most of Eastern Ontario and many of the districts of Northern Ontario, particularly Muskoka, Parry Sound and Sudbury.

Without calcium or magnesium there could be no plant or animal life. In plants, calcium promotes root formation and growth, regulates the intake of other plant foods, influences seed production and increases the calcium content of feed and food crops and with phosphorous forms a large part of the bones and the teeth in humans and animals. It is essential for the clotting of the blood, the steady working of the heart and other muscular activity. Magnesium is the mineral base for the formation of chlorphyll or green coloring matter in the leaf upon which all life depends.

If these elements become deficient in the soil, yields will be reduced. These same elements will be deficient in crops grown on those soils which will reflect in nutritional disorders and impaired health in both animals and human.

The first step in determining the needs of the soil for lime is the soil test. The presence of relatively large numbers of certain weeds is an indication, but not always an accurate guide. The Ontario Department of Agriculture maintains a soil testing service available to any one without cost. Instructions for taking samples and boxes for sending samples to the nearest soil laboratory may be secured from the office of any agricultural representative. Where limestone is needed, usually one to two tons is applied per acre and except where extremely finely ground limestone is applied, one application will be effective for at least four years.

Limestone Use

Limestone can be applied at most any time during the year, but is most effective when applied so that cultivation for the succeeding crop will thoroughly mix it in the soil. For pasture, probably fall applications are better so that the action of freezing and thawing, winter rains and melting snow, work the material down into the root zone. It is important that lime be applied evenly and this can best be done with one of the lime spreaders now on the market.

Agricultural limestone is usually a by-product of a quarry where road building materials are produced. In order to provide agricultural limestone at a reasonable price to all farmers and at the same time maintain quality and the proper degree of fineness in the product, the Ontario Department of Agriculture in conjunction with the Dominion Department of Agriculture and the railways provide an Agricultural Limestone Freight Assistance Policy. In the first place, the railways provide an average 25 per cent reduction in their standard tariff. Furthermore, a subsidy of approximately 50 per cent of the reduced freight is paid in Old Ontario. In Northern Ontario the subsidy is $1.75 to $2.00 per ton depending on the district. For short hauls or where rail transportation is not economical, a truck subsidy of three cents per mile per ton up to $1.00 per ton is provided.

These subsidies apply only on agricultural limestone purchased from approved quarries where crushing, screening and loading equipment are adequate and where the product is maintained at standard levels of quality and fineness.

The Ontario Policy requires that agricultural limestone contain at least 85 per cent calcium carbonate or its equivalent in magnesium carbonate. The physical requirements are:

100% through a 10 mesh screen
50% through a 40 mesh screen
30% through a 100 mesh screen

In order to qualify for subsidy, all purchasers must secure a permit from the local Agricultural Representative. Permits are issued in triplicate in three colours. The Pink copy is forwarded by the Agricultural Representative to the Crops, Seeds and Weeds Branch; the White copy is forwarded to the lime company with the order; and the Blue Copy is retained by the purchaser.

In the case of carlot shipments, the amount of subsidy is deducted from the invoice cost of lime and the subsidy is paid to the lime company. This system saves a lot of bookkeeping and at the same time the purchaser is allowed the full amount of the subsidy. In the case of truck shipments the final purchaser must sign an application for subsidy at the Agricultural Representative's office giving weight, cost and mileage and this is sent to the Crops, Seeds and Weeds Branch accompanied by the invoice from the lime company. Subsidy on truck shipments is paid direct to the final purchaser.

Under the Ontario Policy, the sources of agricultural limestone must be approved. The present approved sources are:

North American Cyanamid Company, Beachville, Ont.
Canada Crushed Stone Company, Dundas, Ont.
Walker Brothers, Thorold, Ont.
Aluminum Company of Canada, Wakefield, Que.
Verona Rock Products, Verona, Ont.
Kirkfield Crushed Stone Limited, Kirkfield, Ont.
Standard Lime Company, Joliette, Que.
*Haldimand Quarries, Hagersville, Ont.
*Springvale Lime Products, Hagersville, Ont.

*The last two named quarries are not yet in production on agricultural limestone. The rock is satisfactory chemically. Final approval is contingent on the physical condition (degree of fineness) after grinding.

These three are likely talking about importance of Soil — left to right — Premier Leslie Frost, Heber Down of Brooklin, and Agricultural Minister Col. the Hon. T. L. Kennedy.

Prices of Stone

Prices at the quarry on cars in bulk range from $1.00 to $2.00 per ton. Agricultural limestone in bags ranges from $3.00 to $5.00 per ton. Prices vary depending on location, degree of fineness and size of bags.

There are of course many other sources of limestone which can be used on the soil providing the product is in suitable condition for economical handling. Material from almost any limestone quarry is useful. If the material is coarse, the reaction in the soil will be slow. Marl, lime cake from sugar factores and waste material from lime kilns are all useful providing they can be handled and spread satisfactorily.

Too much lime can be detrimental to crops. It is usually good policy to apply lime in accordance with the needs of the soil as indicated by soil tests. Lime is credited with increasing scab infection in potatoes, but if lime is needed on potato land to get satisfactory green manure crops to plow down, small amounts of finely ground limestone may safely be applied directly following the potato crop. Most of our crops require a neutral or slightly alkaline (sweet) soil. Large applications of fertilizer or manure will not give satisfactory results on lime deficient soils. The application of limestone will pay on lime deficient soils. The Ontario Limestone Freight Assistance Policy is designed to equalize the cost of limestone regardless of distance from the quarry.

Courtesy of Farmer's Advocate

QUIZ MEMBERS DISCUSS CROP IMPROVEMENT PROGRAMME.

This panel performing at the Ontario Crop Improvement Association Convention are, sitting, left to right: W. M. Cockburn, Newmarket; A. A. McTavish, Paisley; Alex Davidson, Agincourt (Chairman). Standing, from the left: W. I. Schneller, Baden; Wallace Laidlaw, Wilton Grove; and L. B. Mehlenbacher, Cayuga.

REGISTERED SEED GROWERS' MEETING

PUBLICITY TO EXPAND THE USE BY FARMERS OF REGISTERED SEED

by H. G. L. Strange, Director, Agricultural Research, Searle Grain Company, Winnipeg, Man.

THE world today is in a greatly confused state. It is probable that never before in the history of international trading have there been so many restrictions and handicaps placed by Governments in the way of the distribution and exchange of foodstuffs, goods and commodities between the different nations.

Almost every political and economic matter that one can mention today, appears to be the subject of violent argument and controversy. There is, however, one principle of life with which it seems everyone agrees, regardless of race, or of political or economic belief which is *that in order to live, people must eat.*

There is one other matter too upon which those who have studied the question of the people's foodstuffs agree, which is that there never has been, is not today, and perhaps never will be sufficient food to provide an adequate level of living for *all* the people of the world. This means that an increased production of foodstuffs taking the world as a whole, is still mankind's major problem, just as it has been since the start of man's recorded history of some 6,000 years. It would seem then that anything that will tend to increase yield and promote higher quality in foodstuffs is also a matter upon which all who understand world agriculture should agree.

Increased Yield

One of the most effective methods of increasing yield per acre and the quality of foodstuffs is by the means of the use of good seed. There never has been a time since agriculture started thousands of years ago, that this basic principle has not been stressed by agricultural authorities and by statesmen. Our Bible and the classic writings of ancient Greece and Rome teem with references to the importance of the use of good seed.

In Canada this means the use of *Registered* seed, for Registered seed is true-to-variety, represents the very latest strains and varieties that contain all the qualities and superior characteristics introduced into such superior varieties and strains by plant breeders, is of high germination and contains a very minimum of other kinds of grain and impurities. Registered seed, in short, is of a high standard of excellence and produces field crops of higher yield and higher quality. It is well to remember that by and large field crops form the foundation of the great bulk of all the foodstuffs consumed by mankind, averaging about two pounds for each person each day. Anything, therefore, such as Registered seed, that will increase the yield and the quality of field crops must tend to provide more and better food for the hungry people of the world.

Those who have given considerable study to the problems of agriculture, agree about the advantages to the farmers and to agriculture as a whole, of the use of Registered seed. Quite a good percentage of Canadian farmers too,

by actual experience, have discovered for themselves the virtues of this high quality product. Sadly enough, however farm surveys reveal that there still exists quite a good percentage of Canadian farmers who are still not aware of the merits of Registered seed. There, is, therefore, a good opportunity for profitable additional effort to persuade more farmers of the advantages to themselves and to Canadian agriculture of an increased use of this valuable product.

The Canadian Seed Growers' Association is charged by the Government with the duty and responsibility of pedigreeing Registered seed, of encouraging its production, and of seeing to it that the Registered seed produced is up to the highest possible standards practically obtainable. The Association has long been aware that increased publicity to show farmers the value to them of Registered seed would represent time and money well spent. Unfortunately, during its 42 years of existence, the Association, because it functions with a Dominion Government grant, has never been in a position, until recently, of conducting any effective campaign itself, because of the lack of funds. The Association, therefore, has been obliged, during all these years, to rely on other organizations and institutions to perform this type of educational and publicity work.

It must be stated here, however, that within the limits of time and funds available, these other organizations have done good work indeed. Many branches and divisions of our Dominion Government, our Provincial Departments of Agriculture, our Universities and a number of private organizations which are interested in agriculture, have, each year, themselves given a considerable amount of publicity to Registered seed.

Purpose of Grant

The Canadian Seed Growers' Association, however, has always felt that more could be done, and should be done, by the Association itself. In 1948, for the first time in its history, the Association instituted a system of charging seed growers an assessment fee on each acre of crop registered. The growers were quite willing to pay this modest assessment fee, which brought into the Association quite a sum of money, all additional to the Dominion Government grant. It might well be said here that the purpose of the Dominion grant is to enable the Association to pedigree the crops, to set rules and regulations, and to see that the crops produced are up to the standards as set from time time by the Association, and as required in the final finished product by the Seeds Act. The Government grant, however, has never been sufficient to allow for much publicity, or even educational work among the members. The assessment fee, however, that was charged in 1948, and which probably now will be charged each year, has provided funds to permit of such educational and publicity work being done.

In the fall of 1948, the Association appointed a Publicity Committee and allotted to this Committee the sum of $10,000 to perform educational and publicity work for the year.

The Committee tentatively thought of spending this money by taking advertising space in newspapers and of speaking in such space about the value to the farmer of the use of Registered seed. In considering details, however, it was found that advertisements would have to be carried, in order to have

complete coverage, in no less than 937 weekly and daily newspapers and magazines throughout Canada, which would make the space available in each paper entirely too small to have much effect. Advertising agencies were consulted and it was the consensus of opinion of these experts that an effective national campaign through the medium of newspapers and magazines would cost between $30,000 and $50,000, entirely beyond our means. So the Committee decided to try and obtain as much advertising space, in one way or another as they could to be donated by various firms and organizations. The following plan was adopted:

Three hundred and fifty thousand copies of a message entitled "Better Seed Produces a Better Crop" were printed attractively in black on one side of a yellow sheet, three inches by eight and one-half inches — so that it would go easily into a long envelope. These were distributed to elevator companies, large mail order and commercial houses, creameries and certain Government departments to be placed, by them or their agents, into the hands of individual farmers. The leaflets were printed in French and English and were worded so as to conform to the different agricultural conditions of different provinces.

None of these were distributed in the Province of Ontario for that Province notified us that they had already printed and distributed a somewhat similar leaflet and at their own expense which effort was greatly appreciated by the Canadian Seed Growers' Association. All in all then almost every farmer in Canada received or saw one of these leaflets and in a language each could read.

The editors of 937 weekly and daily newspapers and magazines throughout Canada were requested to write either an editorial or an article in their papers drawing to the attention of farmers the value to them of the use of Registered seed. The Education Committee supplied draft copies of editorials and articles. Clippings from various newspapers and magazines were accumulated and revealed that 564 different periodicals did publish either special editorials or articles without charge and which mentioned the value of registered seed. It is highly probable too that many more published such editorials and articles, but which did not come to the attention of the Committee. The total of these editorials and articles came to 6,326 column inches, but this refers only to editorials and articles published in English and French. We do know that a certain number were also published in Ukrainian, German, Polish, Swedish and Norwegian but which were not collected by the Committee.

The Committee next wrote to a large number of organizations which ordinarily carry institutional advertising in weekly newspapers, farm papers, daily newspapers and magazines. We asked these people if they would be kind enough to donate one or more of their advertisements to speaking about the value of Registered seed. The Committee supplied them with appropriate copy. This group included line elevator companies including the United Grain Growers and the Wheat Pools, brewers and distillers, the Barley Improvement Institute and some other firms. They all responded most generously and the advertising space devoted to the use of Registered seed and collected by the Committee amounted to 29,507 column inches.

The Committee wrote to 101 broadcasting stations throughout Canada asking them to be kind enough to make mention now and again of the value to farmers of the use of Registered seed. It was reported to us from every province that this was done by many broadcasting stations. Unfortunately,

we have no method of knowing how much of this kind of mention was made over the air, but we have reason to believe it was considerable.

One or two organizations which were buying time over various broadcasting stations were kind enough to devote several ten or fifteen minute talks, at their own expense to the value of Registered seed.

The value of the advertising space taken up by advertisements and by editorials and newspaper articles at the minimum rates one would have to pay for such space and which had been collected by the Committee amounted to $13,613. It is to be remembered, however, that there certainly was a good deal more said about Registered seed than the Committee was able to collect and assess for value.

Good Publicity

The Committee next wrote to branches of the Dominion Government, Provincial Governments and to our Universities and to Dominion Experimental farms, asking them if, from time to time, they would make a special effort to publish additional information sheets and press news going to newspapers about Registered seed. Every one, without exception, assured us they would do this, so that a good deal of additional mention was made of the value of Registered seed by these institutions and organizations, and a great deal of this news was republished by hundreds of weekly and daily newspapers as is the usual custom.

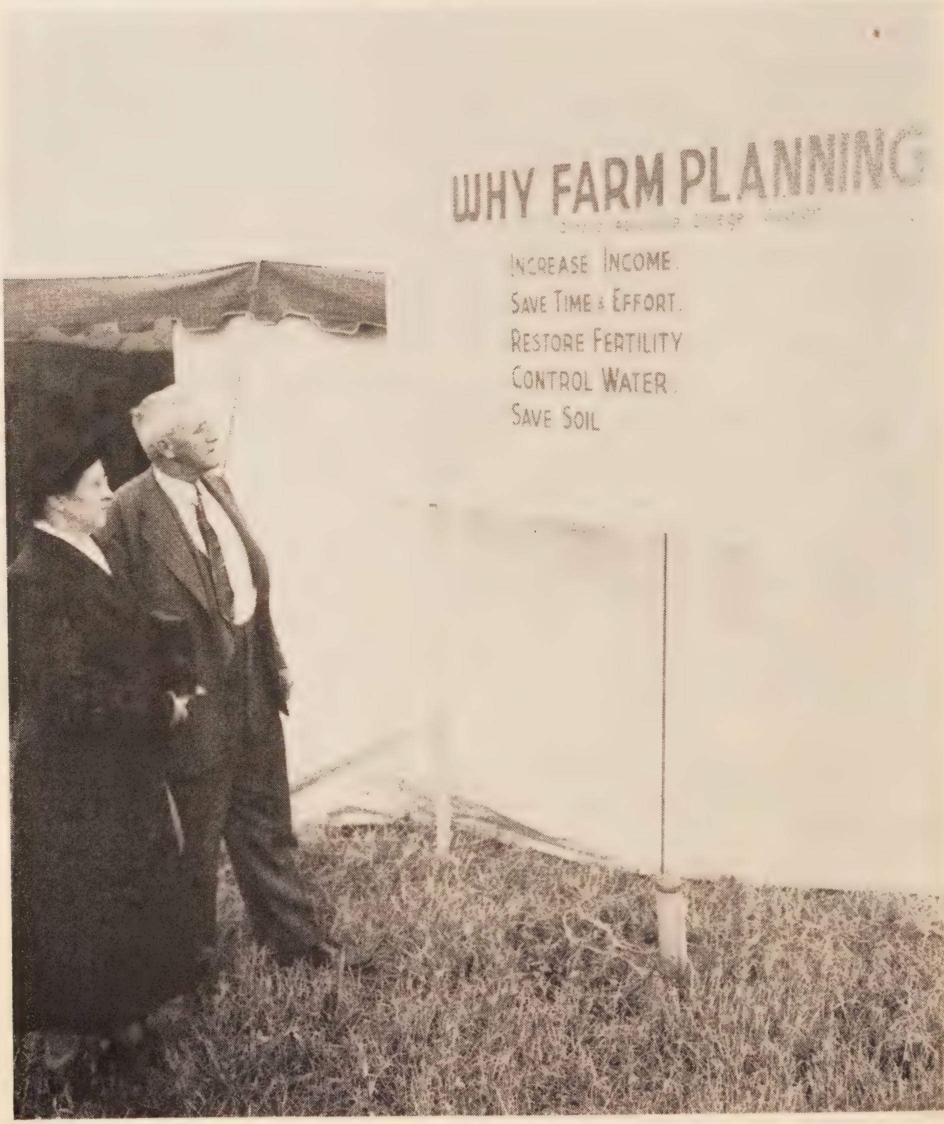
At the end of the seed selling season, the Committee communicated with most of the organizations which distributed seed to farmers. All reported that beginning with February — the time when the Publicity Campaign was at its height — they had received orders from farmers for Registered seed far in excess of their expectations, and far in excess of the amounts demanded by farmers in any previous season from February to the end of the season, about May 31. Several of these organizations were kind enough to offer the opinion that the Canadian Seed Growers' Associations' campaign had been, in no small part, responsible for the increased demand for domestic Registered seed

For educational purposes among the members, the Committee designed and published a pamphlet entitled "First Steps In The Production of Registered Seed, Together With Some Reminders to More Experienced Seed Growers." Twenty-one thousand copies of this booklet were printed and distributed to members and prospective members of the Canadian Seed Growers' Association through many different sources; i.e. Government Departments, Universities and elevator agents, and a second edition of five thousand has since been printed. It might be mentioned that prairie elevator companies, including the Pools and the United Grain Growers, paid for one-half of these booklets and distributed them at their own expense.

Next the managers of 392 central seed cleaning plants throughout Canada were sent a mimeographed circular and asked to post this up in a prominent place in their cleaning plants. This circular drew attention to the kind of errors that had been made in the past by some cleaning plants in the cleaning of Registered seed, and it urged managers to see that the rules and regulations of the Canadian Seed Growers' Association and of the Dominion Seed Branch were strictly abided by, and that every effort would be made to clean Registered seed, not to minimum standards as set by the Seeds Act, but to the highest

possible standards attainable. Attention was drawn to the fact that farmers did not buy Registered seed on standards set, but rather on what they observed when they opened the sack, and that an insigificant percentage of impurities in a sack of Registered seed where the impurities were visible to the eye, was often the cause of disappointment and discontent, and sometimes to refusal to accept the seed. It might be mentioned that this same point is most carefully emphasized to all seed growers in the booklet "First Steps."

All this work used up a trifle less than $1,500 of the $10,000 given to the Committee by the Association. The Committee then decided to use the



Mr. and Mrs. Heber Down studying the Farm Planning Text and wondering what the future productivity of this farm has in store for them.

balance of the money to make a movie film, which would show the important steps that have to be taken for the successful production of Registered seed, from the time the plant breeder makes an original first cross to make a new variety to the final product — bread in this instance. This film is in colour and sound with narrative accompanying the film and with appropriate music. It is a 16 m.m. film and takes 53 minutes to run. The Committee was advised that an audience would not look at a film over 35 minutes in length. When it came to make this film, however, it was found that it was quite impossible to tell the proper story in such a short length of time, so the Committee decided to assume a risk and tell the whole story which, it was found, took 53 minutes.

The film is slanted to appeal to three different groups of people:

First, to new and less experienced seed growers so that they can observe the proper and efficient practices adopted by more experienced seed growers, and how, when regulations are not strictly adhered to, disappointment is caused to seed growers and considerable time and expense to the Head Office of the Association. It is considered then that the film would be of educational value to the membership.

Secondly, the film, it is hoped, will appeal to farmers in general who will be able to see and hear with their own eyes and ears the work and pains and care that go into the production of Registered seed. It is thought that farmers will realize by all this the value of Registered seed, and why a premium has to be charged to recompense seed growers for the additional work that goes into the making of the product.

Thirdly, the film, it is expected, will show to consumers and buyers of Canadian farm products, the care that is taken to assure high quality in the finished processed products which they finally buy, which, it is hoped, will have the effect of reaffirming the buyers' confidence in the quality of Canadian farm products.

Copy for U.N.

To get the full benefit of the film, it is hoped that arrangements might be made, perhaps by the Association or by some other body, to present a copy of the film to the United Nations at Washington — who tell us they are anxious to have a copy — for showing to the delegates from some 58 or so nations, and perhaps for showing in their respective countries; and that an additional copy might be presented to an appropriate organization in Britain for the purpose of advertising the superior quality of Canadian farm products.

The Canadian Seed Growers' Association pedigrees over 300 strains and varieties of plant stocks. It was obviously impossible to deal with many of these, so wheat, being our main export agricultural product, was chosen to illustrate the principles involved, although some mention was made of other kinds of stocks as well.

If the film meets with approval, and is successful for the purposes outlined, it is hoped by the Education Committee, that from time to time additional short reels might be made that would deal particularly and in detail with the Registered stocks of different provinces — vegetable and flower stocks in British Columbia, forage and field root stocks and corn in Ontario and Quebec, potatoes and field root crops in the Maritimes. This, however,

is something to be considered for the future and is conditioned on the reception received by the film.

For what it may be worth, the Committee came to the conclusion that education and publicity by means of a film in colour and sound will, in the future, form an important adjunct to existing methods of education and publicity work.

I would like to say on behalf of the Committee that we were agreeably impressed with the most willing co-operation we received from Dominion and Provincial Governments, from Universities and from private trade organizations of many kinds in donating publicity for the use of Registered seed. Almost, without exception, most organizations and individuals, who depend directly or indirectly upon agriculture for their prosperity, realize that good crops are a vital necessity to assure the prosperity of farmers, and that good seed is the very foundation of good crops.

The Committee believes finally that the sources of publicity which it explored and used so successfully can, with careful planning, be exploited and perhaps expanded in the future and in all provinces.

The Committee estimated the percentage of farmers who used Registered seed, and came to the conclusion, as already has been stated at the start of this paper, that there is still a large field to be covered, which, if it can successfully be done — and there is no reason why it cannot be done — will lead to still higher yields per acre and to still higher quality in the field crops of Canada, hence in some reduction in the cost of production of livestock products which depend upon field crops for their development.

THERE IS NO SHORTCUT TO SUCCESS IN GROWING REGISTERED SEED

by N. D. McKenzie,
Plant Products Division, Toronto

MR. CHAIRMAN, Ladies and Gentlemen, the title of my address might be likened to the old proverb, "There is No Royal Road to Learning."

However, before getting down to the text which was given me I feel that I should clear up a mistaken idea which exists in the minds of a number of seed growers as to the position which the Plant Products division occupies in the production of Registered seed.

All of you who are listening to me are probably quite clear as to our status but it is quite evident on the basis of correspondence which we receive from some growers that they are not fully informed in this regard.

It should be clearly understood by all parties concerned that up to, and including the issuance of a crop registration certificate, the officers of the Plant Products Division are merely acting as agents for the Canadian Seed Growers' Association and have no power in themselves regarding the acceptance or rejection of a crop for registration. Our inspectors merely report the crop and all circumstances regarding it to the Seed Growers Association and the decsiion regarding the issuance of a certificate is entirely the duty and prerogative of the Canadian Seed Growers' Association themselves. The grower receives or should receive a copy of the field crop inspection report from the inspector at

the time the inspection is made and it is his prerogative, if he feels that the inspector has not reported the field and conditions regarding it properly, to lodge a protest with the Association and demand a re-inspection of the field.

The fee paid for field crop inspection goes to the Receiver General of Canada and is on the scale laid down under the regulations of the Seeds' Act and has nothing whatever to do with any fees or assessments which may be laid down by the Canadian Seed Growers' Association as payable by their members.

From the time the seed crop certificate is issued, however, the seed covered by that certificate comes under the Seeds' Act and its regulations and must conform to the requirements of the Act and its regulations.

Now to return to the subject assigned to me. Since the outbreak of the late war, there has been a tremendous increase in the amount of Registered seed produced in Canada and marketed both at home and in other countries. I am rather afraid that this unprecedented increase in production and sale of Registered seed has attracted to the business of seed growing, a type of individual who is solely interested in the financial returns to be obtained in the growing and selling of Registered seed.

Entitled to Profit

You must understand that I am not in anyway suggesting that the profit motive should be disregarded. Far from it. Anyone who does a good job is entitled to a profit in doing that job and in fact it has been strongly in my mind that the premium in force at any time for the production of Registered seed is not as large as it should be over commercial grain when the care and labor involved in its production is considered. However, I do feel strongly that the production of Registered seed should be in the hands of a comparatively small number of men who are willing to give a service above and beyond the mere minimum required for the production of Registered seed.

A great many of the new growers of Registered seed are quite apparently not sufficiently familiar with the requirements of the C.S.G.A. in regard to isolation, purity, freedom from disease, etc. and one of the biggest jobs the Registered seed growers section of the Crop Improvement Association has ahead of it, is to find a satisfactory means of getting the necessary information in the hands of the growers in time to be of any value to them in securing crop registration. The second part which may be the hardest, is to get these growers to read and act on the information provided. It is too late for any assistance by the time our inspectors reach the farm to do the crop inspection.

All too few of even the older growers seem to be prepared to do any roguing in their field before the time of field crop inspection.

C.S.G.A. circular No. 6 and the very good booklet prepared, I understand, by Major Strange and issued in February, 1949 by the C.S.G.A., under the title "First Steps in the Production of Registered Seed," if read and followed, would solve most of the difficulties which at present are causing many growers to have trouble in securing crop registration certificates.

There is no doubt that members of the C.S.G.A. should receive these publications and I imagine have done so, but quite evidently a considerable proportion of those who did receive them either did not read them, or if they read them, did not act on the information provided.

There is also the case of the new grower who purchases Registered seed for the first time and may not have sufficient information as to the necessary steps to be taken in order to have his crop registered. There is no way at present by which this man may be reached and provided with the information he should have.

I would suggest that the Provincial group of Registered Seed Growers see to it that every member of a county crop improvement association be provided with these two circulars and that supplies of them be placed in every office of the Agricultural Representatives in the Province.

In these days of disappearing markets, I feel that the greatest potential market existing for Registered seed is right at our own doors in our own counties.

When we realize that more than a third of the seed sown by farmers in this province is of rejected grade as shown by the seed drill surveys which have been conducted, then we can begin to realize the potential market which lies right at our own doors and the possibilities which lie ahead for those of our growers who can combine with the care and thoroughness necessary to produce Registered seed, the sales ability to market it to the neighbouring farmers of their own community. This might also be an added spur to keep their own operations on such a high plane that their neighbours should have no hesitation in buying seed from such a well and carefully run farm.

No matter what market we are catering to, the primary motif of our seed production should be quality, both as regards to purity and appearance.

Probably the major factor which determines our buying taste, whether it be the clothes we wear, the food we eat, or the seed we sow, is the appearance of the product and the way it attracts us as we look at it. While in seed a comparatively poor looking sample may have all the purity and breeding necessary to produce an excellent crop, it will remain unsold while a possibly inferior article from a purity and pedigree standpoint will, if attractively prepared for sale, outsell the better product purely on its appearance.

In conclusion, while I may have seemed rather critical of a lot of potential growers of Registered seed, I would like you to feel that the reason I have raised the points I have, has been in an endeavour to present some of the undesirable things which exist at present, in the hope that one or two of the suggestions I have made may be of some help in correcting these conditions.

A human being is a chap who will split his sides over the family album, and then look in the mirror without cracking a smile.

WINTER WHEAT IMPROVEMENT IN ONTARIO

by W. H. Waddell, Chief of Research (Winter Wheat)
Field Husbandry Department, O.A.C., Guelph

WINTER wheat in Ontario is assuming a position of major importance as a grain crop. An all-time high in production was reached in 1948, and the crop in 1949, although reduced considerably by dry weather, was very satisfactory. The increased production of fall wheat in the last few years appears to be due to an increase in acreage, to better cultural practices and to the use of better varieties.

The importance of the winter wheat crop may be judged from the following table, which was compiled from the monthly crop report of the Ontario Department of Agriculture, December 1949.

PRODUCTION AND VALUE OF THE TEN MOST IMPORTANT FIELD CROPS IN ONTARIO IN 1949, ARRANGED IN ORDER OF TOTAL VALUE

Crop	Acres	Yield per Acre Bus.	Total Production Bus.	Total Value $	Value per Acre $
Hay, Clover	2,950,700	1.25*	3,679,000*	72,072,000	24.43
Oats	2,086,100	34.5	71,938,000	55,392,000	26.55
Fall Wheat	805,000	30.7	24,726,000	42,281,000	52.52
Mixed Grains	1,211,300	35.3	42,959,000	39,522,000	32.63
Alfalfa	802,000	1.78*	1,426,000*	29,946,000	37.34
Fodder Corn (Green)	417,500	10.00*	4,166,000*	24,163,000	57.88
Potatoes	117,000	160.0	18,697,000	21,875,000	186.97
Husking Corn (Shelled)	250,100	52.4	13,107,000	16,253,000	64.99
Barley	227,900	30.3	6,896,000	8,068,000	35.40
Turnips and mangels	48,800	30.3	14,773,000	7,682,000	157.42

*Tons.

It will be noted that winter wheat ranked third in total value as a field crop in Ontario in 1949. The order of value of these crops were essentially the same as for 1948. The column for value per acre shows that winter wheat compares favourably with any of the field crops when consideration is given to cost of production and labour involved.

Fifty-Bushel Winter Wheat Clubs

Important factors in the production of pure seed of winter wheat are the Fifty Bushel Clubs which were designed to increase the supply of pure seed. Entries in the club are limited to fields sown to Registered Dawson's or Commercial No. 1 Cornell 595. Since these fields must be five acres or larger and usually receive special attention, large amounts of good seed are produced by the club members. Eventually it is expected that an average of 3,000 bushels of Registered seed will be produced by each county having a Fifty Bushel Club.

In addition to the county clubs, we have an inter-county competition limited to the three top county members. Competition is for appearance of the seed and milling quality.

While drought was severe in some areas of Ontario in 1949, phenomenal yields of winter wheat were obtained in other areas. The following list indicated that twenty farmers in the Fifty Bushel Club contest had yields of over 60 bushels per acre.

THE TWENTY HIGHEST SCORES FOR YIELD IN THE FIFTY BUSHEL WINTER WHEAT CONTEST IN 1949

Name	County	Bus. per Acre
1. R. K. Squair	Durham	68.3
1. Chas. F. Casey	York	68.3
2. Ed. Ruthven	Durham	67.5
3. Chas. E. Osborne	Durham	66.7
4. Alex. M. Stewart & Son	Middlesex	66.0
5. R. E. Pooley	Huron	65.2
6. E. F. Metcalfe	Lambton	63.6
7. Allan Walper	Durham	62.4
7. W. Vail & Son	Middlesex	62.4
8. J. Stoskopf	Perth	62.0
9. Allan S. Donald	Lambton	61.6
10. Russell K. Bragg	Durham	61.3
10. Edgar Dennis	York	61.3
11. Gordon Kellogg	Durham	60.5
11. T. R. Harrison	Ontario	60.5
11. A. G. Murray & Son	Middlesex	60.5
12. Garnet Rickard	Durham	60.1
12. J. Squires	Lambton	60.1
12. Wallace Laidlaw	Middlesex	60.1
12. Eaton Hall Farm	York	60.1

It is interesting to note that more than one-third of these high yielding fields, were in Durham County and that over one-half of the fields were in Durham and Middlesex Counties.

Wheatland Day

Intense interest in winter wheat was demonstrated by farmers of Ontario when over 3,000 gathered at Langstaff for Wheatland Day on July 27, 1949. The demonstration was held at Leitchcroft Farm owned by Gordon C. Leitch.

Wheat plots of varying sizes had been layed out over an area of 20 acres with a three-fold purpose: (1) to show different varieties (2) for a yield competition, and (3) to demonstrate harvesting equipment. Seven makes of combines were in operation at one time and other equipment included swathers, pick-up balers, and forage harvesters to handle the straw. Several types of tilling equipment were demonstrated after the straw was removed.

An interesting item on the program was a yield competition between the two wheat varieties, Dawson's Golden Chaff and Cornell 595. Two acre plots of each had been sown in exactly the same manner. These plots were combined the previous day and the following yields obtained:

	Bus. per Acre
Cornell 595	37.4
Dawson's Golden Chaff	31.5
Advantage in favour of Cornell 595	5.9

The above yields were obtained despite the fact that the crop received no rainfall from Easter until after ripening.

The guest speaker at Wheatland Day was Colonel the Honourable T. L. Kennedy, Minister of Agriculture, who gave an excellent address. A special guest was Dr. H. H. Love, Head of the Plant Breeding Department of Cornell University, N.Y., and breeder of the new wheat, Cornell 595.

The Wheatland demonstration was extremely well organized and managed by the Agricultural Representative of York County, Mr. W. M. Cockburn, and his committee. Chairman for the day was Mr. Clark Young of Milliken.

A similar Wheatland Day has been planned for Middlesex County in 1950.

Halton County Survey

A very interesting and profitable study was carried out for two years on the Fifty Bushel Club Winter Wheat plots in Halton County. A complete questionnaire embracing all factors in relation to the crop was secured by visiting each plot twice yearly. The survey was made by the Agricultural Representative, Mr. J. E. Whitelock, with Mr. Wm. Breckon, Freeman P.O., assisting. Officials of the O.A.C. ran tests on the wheat and made a preliminary survey of the data. A detailed study was made by Dr. H. L. Patterson, Department of Agriculture, Toronto.

From the survey it appeared that the correct practices to obtain the maximum yield in Halton County are:

1. Fertilizer at the rate of 200 pounds per acre or more.
2. Thirty days or more between plowing and seeding of the crop.
3. Four times or more over with tillage machines between plowing and seeding.
4. Seeding before September 15th.

It was noted that Cornell 595 outyields Dawson's by a wide margin.

The importance of following the practices mentioned above is shown by the yield results given below.

Number of Farms	Number of the Four Points Listed Above on Which the Farmer Was Right	Average Bushels per Acre of Group
7	1	32
10	2	36
15	3	39

Study of Effect of Soil and Climate

An intensive study of the effect of soil and climate on the yield and quality of winter wheat is being conducted as a graduate thesis at the Field Husbandry Department, O.A.C., by Mr. G. R. Johnston. While the effect on quality is primarily of interest to millers, it is of great interest to farmers to know the effect on yield, of the type of soil, nutrients in the soil and application of fertilizers. Three locations have been chosen as follows, Guelph, Brampton and Hespeler on loam, clay and sandy soil respectively.

Three varieties of winter wheat have been sown with five replications at each station, the whole experiment being repeated with fertilizer application. A detailed study will be made of the moisture content, nutrients and bacteria in the soil at the various stations, during the growth of the plants. In addition, a chemical analysis of the plants will be made to determine the uptake of the nitrogen, phosphorus, potassium, and calcium. Yields on the various plots will be correlated with the soil tests, composition of the plants and the climate.

Root Studies

During the extreme dry period which occurred in large areas of Ontario in the summer of 1949, it was thought that the Wheat crop would be a failure, but yields up to 40 bushels per acre were obtained in this dry area.

The unexpected results prompted a study of the root system of the wheat plant at the Field Husbandry Department of the O.A.C. A deep trench was dug alongside the ripe plants and the soil was washed away from the root

system by means of a gentle spray of water. The complete root systems of several plants were washed out, removed and mounted on plyboard. It was found that some of the roots penetrated the soil to a depth of 57 inches.

As the soil was quite dry to a depth of 3 feet, it was concluded that much of the food used by the growing wheat plant came from below the three-foot level.

Co-operative Yield Tests

Extensive rod row tests of winter wheat were carried out in Ontario in 1949. Twelve varieties were sown at ten stations with five replications in each test. Five were located on Government land and five were on farmer's fields. Three red wheats recently released in the United States were tested for the first time; Butler from Ohio, Vigo from Indiana and Blackhawk from Wisconsin.

Butler stood highest in the test for yield. The other new varieties gave low average yields throughout the province, but were higher than Wilson, the standard for red wheats. Yields in general were rather low, the Harrow station being the only one to exceed 50 bushels per acre.

The following table gives the results for yield, straw strength, leaf rust and weight per bushel for the seven named varieties in the test. The variety Blackhawk showed considerable resistance to leaf rust.

Variety	Yield	Straw Strength	% Leaf Rust	Weight per Bus.
Butler	36.6	8.65	34.0	58.85
Cornell	35.8	8.10	51.0	56.45
Fairfield	35.5	7.80	36.0	57.70
Dawson's	35.4	8.18	56.7	57.10
Vigo	35.3	7.65	33.5	58.90
Blackhawk	33.6	7.65	8.8	59.50
Wilson	33.4	7.60	44.0	59.45

The south-western part of the province is considered to be a red wheat area. This appears to be borne out by the yield results of the Co-operative Tests in 1949. The following tables show the yields of the seven named varieties at the stations in the red wheat and the white wheat areas.

New methods have been introduced in our breeding program to decrease the amount of labor involved and increase the amount of material under test. Last fall a new method which we call the "clump nursery" was used. Heads from different plants were collected at harvest time and later were threshed out by hand in the field and sown in single rows 18 inches in length. This is the smallest unit ever used in our breeding work. By this means almost 2,000 new lines will be tested to leaf and stem rust in a very limited area.

The Ontario Millers' Association has given excellent assistance to this breeding work during the past two years. In addition to direct assistance to the breeding program, a group of mill chemists act as a committee to carry out quality tests on the breeding material and assist in selecting new varieties suitable for pastry purposes. It is important that new varieties should be of proper quality since approximately $10,000,000 worth of winter wheat is milled annually in Canada. Virtually all of this wheat is grown by the farmers of Southern Ontario.

The breeding work is carried on in close co-operation with the Central Experimental Farm, Ottawa, where Mr. A. G. O. Whiteside has an excellent winter wheat breeding program under way. The variety, Rideau, which is exceptionally winter hardy, is a result of the work at Ottawa.

Stanley Young of the Crops Branch, scoring a field of wheat entered in the 50 Bushel Winter Wheat Club on the farm of E. H. Buck, Paris, Brant County, 1949.

NEW METHODS IN SEED TREATING

by J. D. MacLachlan, Professor and Head of Department of Botany, O.A.C.

AM SURE everyone will agree that it pays to treat seed grain from the standpoint of both yield and quality. Seed treatment is almost a necessity to keep down the smuts; it is also good insurance against loss from seed decay and seedling blights.

Am sure everyone will also agree that there is not sufficient of the seed grain being treated in Ontario with the result that smuts are all too prevalent. Bunt or Stinking Smut in winter wheat was especially severe in some areas this year. One lot of about 250 bushels of registered but untreated Cornell 595 was distributed in the Chatham area a year ago. The fields sown to 100 bushels of this seed lot were examined at time of combining and the bunt content of the grain ran as high as 10 and even 20 per cent. Why do growers purchase Registered seed and not have it treated? I believe in the case of Cornell 595 growers are confused concerning smut resistance. They do not realize that Cornell 595 is resistant to Loose Smut only and highly susceptible to Bunt.

Failure of growers to accept seed treatment as an annual routine practice can, no doubt, be attributed to difficulties encountered in the treatment processes. The only known treatment for Loose Smut of Wheat and Loose Smut of Barley is the hot water treatment. As you know, these two smut fungi overwinter within the germ of the grain and therefore they are completely protected against any surface chemical treatment that might be used. Very few growers attempt the hot water treatment because the procedure is too complicated. It is much simpler to purchase smut-free seed grain.

Grain Smuts

Our other grain smuts such as Loose and Covered Smut of Oats, Bunt or Stinking Smut of Wheat, and Covered Smut of Barley can be controlled by surface chemical treatment. However, the materials found to be most effective in destroying the fungi on seed grain are not the most acceptable from the viewpoint of handling by the average grower. Formaldehyde has been used for about 50 years and is still used by some. The fumes are irritating to the man doing the treating and certain precautions must be taken to avoid injury to the germ of the grain.

Organic mercury compounds were found to be highly effective for treating seed grain and with ordinary precautions there is little danger of lowering seed germination. However, all these organic mercury compounds are highly poisonous to humans and many growers are scared to use them.

Important strides have recently been made in the development of methods to treat seed grain. Equipment and materials, now available, make seed treatment easier and, in the case of mercury compounds, safer to the user.

I should like to review some of the recent developments in treating seed grain. At the same time I should like to ask a few from our audience, who have had experience with these newer types of treaters, to comment upon them.

A. Hot Water Treatment of Wheat and Barley for Loose Smut

Under the guidance of Professor Scott, Department of Agricultural Engineering, O.A.C., a semi-automatic hot-water treater has been developed.

This treater was described last year at the Crop Improvement Meetings but, since then, several improvements have been made to ensure accurate temperature control. This year a drier attachment is being developed to reduce the moisture content of the grain to a point that it can be easily handled after treating. The machine has not yet been tested on a commercial basis but preliminary tests indicate that it is efficient and easy to handle.

The machine is too expensive for individual growers but would be suitable for use in seed-cleaning plants. It could be readily moved from one locality to another if more than one district wished to use it during a season.

B. Chemical Seed Treatment for Bunt or Stinking Smut of Wheat, Covered Smut of Barley, and Loose and Covered Smut of Oats.

Organic mercury compounds are most commonly used for seed treatment to control these smuts. Since these mercury compounds are poisonous to humans, improvements in treating methods have been directed towards safety for the man treating the grain. The mercury compounds are used as dusts, as slurry or mud suspensions, and as liquids.

(a) *Dust treatments*—

Organic mercury dusts are effective for smut control, but the danger of breathing escaping dust has deterred many growers from using it.

For individual growers, the standard barrel or oil-drum method is effective and safe to use if precautions are taken against breathing the dust.

For large-scale use in seed-cleaning plants, etc., the Kemp seed treater has met the requirements of the Department of Health as to safety to the user. These machines are available and cost approximately $225. with motor, f.o.b. Winnipeg.

Ceresan mercury compounds are commonly used at the rate of one-half ounce per bushel. There are two Ceresan compounds, New Improved Ceresan (5% ethyl mercury phosphate) and Ceresan M (7.7% ethyl mercury p-toluene sulphonanilide).

The British products Lunasan and Leytosan may be used instead of Ceresan.

(b) *Slurry treatments*—

In this method, Ceresan M is mixed with water to make a mud-like mixture and applied to the grain in that form. By this method there is no dust escaping for the user to breathe.

For approximately 32 bushels of grain the following mixtures are recommended:—

Wheat..	1 lb. of Ceresan M to 1 gal. of water
Oats..	1½ lb. of Ceresan M to 1 gal. of water
Barley..	1¼ to 1½ lb. of Ceresan M to 1 gal. of water

Special machines are needed to apply the slurry mixtures and the cost would restrict their use to seed-cleaning plants, etc. The two machines available are:

Gustafson Slurry treater: Capacity 200 to 300 bushels per hour; cost, approximately $655.00 less motor, F.O.B. Fargo, North Dakota; freight, approximately $20.00.
Calkins Slurry treater: Built at Spokane, Washington; cost, approximately the same as Gustafson model.

Details on slurry models can be obtained from C.I.L. dealers. Mr. Ian Maynard, Chatham, has had considerable experience with the Gustafson model, and I am sure you would like to hear his comments on the machine. Mr. Maynard:

(c) *Liquid treatment*—

Recently the Panogen treater has been introduced to Ontario. This machine applies a mercury compound (methyl mercury dicyan diamide) in a liquid form, which is sold under the names Panogen 8 and Panogen 14. I understand a new one, Panogen 23, is being put on the market and that Panogen 8 is being withdrawn. The number following the name Panogen refers to the mercury content, i.e., Panogen 14 has a mercury equivalent of 1.4%. Panogen 14 is being recommended at the rate of ¾ ounce to 1 ounce per bushel for wheat, oats and barley.

The machine (agent — Sullivan Mill Equipment Ltd., Toronto): Cost, approximately $295.00 less motor; claimed capacity, 60 to 75 bushels per hour.

This machine shows promise, but we feel that further tests are needed before we are in a position to fairly compare it with other treating methods available. We have a machine at O.A.C. and will test it on spring seed grain. Mr. Moore of Maple, Ont., and Mr. Stewart of Ailsa Craig, Ont., have had experience with the Panogen treater and I should like to ask these gentlemen to give their opinions on the treater.

Wheatland Day in York County, Leitchcroft Farm, 1949.

In closing, I should like to give a warning about Dwarf Bunt of Wheat. This disease is somewhat similar to our Common Bunt or Stinking Smut of Wheat. It can be distinguished in the field by the fact that bunted plants tilled excessively are less than half as high as healthy plants. It cannot be controlled by any type of seed treatment, hot water or chemical, and our wheat varieties are susceptible. Breeding for resistance to Dwarf Bunt is the only known control program and progress is being made in the U.S.A.

So far, Dwarf Bunt has not been reported in Ontario. It is present in British Columbia and in several states of the U.S.A. including New York State. Our best control measure for the present is to keep Dwarf Bunt out of Ontario. Only Registered seed wheat, known to be free of Dwarf Bunt, should be allowed into Ontario.

TILLAGE

MERITS OF TREATED SEED

by John A. Stewart, Ailsa Craig

SEED treatment to prevent grain smut is a cheap insurance that no farmer can afford to dispense with. Take no chances — treat your seed every year to keep your grain free from the objectionable smut. It is extremely difficult, if not impossible, to estimate the financial loss caused by these diseases. The following rough estimate of the loss has been made, by considering the value of the different grain crops grown in Ontario each year, and, the estimated annual average per cent that the yield of the different crops is reduced by smut.

The farmers in the Province of Ontario lose annually about 10 per cent of the value of the wheat, oat, barley and corn crop because of smut damage, which amounts to approximately $16,000,000. This loss is a needless one, as, with the exception of loose smut of barley and wheat and corn smut, the other smuts can be readily controlled. This point is further proved because the loss due to oat smut is more than that of barley, wheat and corn combined.

Carefully controlled experiments show that the proper use of the right chemicals will kill the fungus spores and bacteria of many important diseases that are carried forward from one year to the next on or in the planted seed. Certain chemical disinfectants are now known to control,—

1. Seed-borne stinking smut or bunt of wheat,
2. Oat smut and seed-borne oat blight (Helminthosporium victoriae),
3. Covered smut, black loose smut and stripe of barley,
4. Stem and covered smut of rye,
5. Seed-borne root rots of cereals,
6. Scab of cereals (Fusarium blight),
7. Loose and covered kernel smut of sorghums,
8. Black leg of sugar beet.

As shown above besides controlling certain recognized seed-borne infections, seed treatments often control some of the diseases that attack young seedlings, that are not seed-borne so far as can be determined. Wheat, oats, barley and corn have all been benefited in stand, vigor of plants and yield of grain under these circumstances. Applied to winter wheat, these disinfectants have usually increased the number of plants living through the winter. Apparently the dust, or liquid which remains on the seed when it is planted, has the power to protect the young seedling from certain soil-borne organisms that are ready to attack when the seed germinates.

Though highly effective and tremendously worthwhile in controlling some very significant diseases, seed treatments are not a sure-all. None of the rust diseases, for example, nor corn smut, nor corn ear rots, nor loose smut of barley and wheat can be so controlled as in the case of the former two, the disease reaches the plant by other avenues than the seed and in the latter two only the hot-water treatment is effective.

The merits of treated seed in financial gain alone far exceeds the cost of treating. Every farmer should hesitate to sow untreated grain when he knows that one or two bushel greater yield per acre is a tremendous return for an investment of 10 to 15c. per acre for treating. Hot water treating pays for

itself many times and farmers should be seeking ways and means of treating their seed, or buying treated seed. Retail dealers and seedsmen should sell nothing but treated seed and seedsmen should strive to sow as much Foundation stock and Elite and first generation seed as possible and remember that isolation is also a big factor in keeping seed free or reasonably free from loose smuts and to a certain extent, for a short period of time, under control.

For extra dollars and cents, buy treated seed, sow good clean seed and if, your own, arrange to treat it now and store it in a good place. Then when seeding time rolls around, it will not be neglected. I am firmly convinced every farmer when he sees a percentage of smut in his fields, feels a slight regret and realizes his loss through carelessness, and when he sees a field just headed out, or, at harvest time, free from the scourge of carelessness, then he further realizes the "Merits of Treated Seed."

Combines are now used extensively to harvest wheat. This is one of the larger types

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Some of the Ex. G.I.'s say that dehydrated potatoes will never be any good, but another process has been perfected whereby light, fluffy potatoes are assured. Scientists have determined that the lumpy, pasty products of war days were due to excessive drying which broke down the starch cells that form the paste. Now they have determined that by leaving a little more moisture than they did and not using so much heat the starch cells are not damaged during the process of dehydration or granulation. The new product when dehydrated, according to the experimenter, is pretty much like the original potato.

2, 4-D ON CEREAL CROPS

by K. S. Murphy, Crops, Seeds and Weeds Branch,
Ontario Department of Agriculture, Guelph

According to the monthly crop report of the Statistics Branch of the Ontario Department of Agriculture for December 1949, the acreage of cereal crops in Ontario in 1949 was 4,495,000 or almost 4½ million acres. This acreage is made up of Fall Wheat, Spring Wheat, Oats, Barley, Fall Rye, and mixed grain. The production figures for these grains are given as 149,796,000 bushels or almost 150 million bushels. This has been valued at $150,000,000.

According to Dr. McRostie, in his article "Losses from Weeds" published in the March 1949 issue of the Agricultural Institute Review, a conservative estimate of reduced crop yields due to weeds has been placed at 10 per cent. Now 10 per cent of 150 million is 15 million bushels or dollars, whichever you prefer. In addition to this loss there are further losses due to the extra cost of harvesting such weeds in extra wear and tear of equipment, extra twine, extra cost of hauling such weeds and weed seeds, and the loss of grade in crops due to the presence of weeds.

With the development of 2,4-D it is now possible to do something about these weed losses. In fact, quite a number are now spraying their grain crops regularly. We have endeavoured to estimate the acreage of cereal crops sprayed in 1949, and with the assistance of our fieldmen, county weed inspectors, and others, we have placed this estimate at between 50 and 75 thousand acres. Actually, this is just a mere one to two per cent of the total acreage of cereal crops. With some 98 per cent of the cereal crop remaining, there appears to be quite a wide open field for development. However, taking into consideration the fact that it has not been generally recommended to spray grain seeded down, it would leave in the neighbourhood of possibly 60 per cent or approximately 2,700,000 acres where spraying may safely be recommended. At an average cost of $1.50 per acre charge for custom spraying, and considerably less where the owner sprays his own, an expenditure of slightly more than 4 million dollars should lessen the weed loss by close to 9 million dollars. This is just another case of spending a dollar to make two. In addition careful spraying for a few years will gradually reduce the weed infestation until spraying will no longer be necessary each year.

Spraying Cereals

Many of us have, no doubt, considered spraying cereals primarily for the control of common mustard. Indeed for mustard control 2,4-D has been spectacular and there is no longer any excuse for tolerating this weed in cereal crops. However, many other weeds are equally well controlled while still others such as some creeping rooted perennials, though not killed, may be reduced to such an extent that damage to the crop is negligible. Annual weeds common in Ontario grain fields which are susceptible to 2,4-D are Annual Sowthistle, Lamb's Quarters, Pennycress or Stinkweed, Pigweed, and Ragweed. Other perennial weeds controlled at twice the rate used for annuals are Canada Thistle, Chicory, Curled Dock, Field Bindweed and Perennial Sowthistle.

A very outstanding advantage of spraying grain has been reported by combine operators. The fact that spraying generally eliminates for the most part the green weed growth at harvest time enables a combine to work with

less strain, cutting down the time of operating, and leaving the threshed grain in a much drier state. Many have reported that the spraying operating paid for itself in the time saved during combining. One of the most troublesome weeds in this respect is ragweed. Although ragweed is later germinating than many of the other weeds, it seems to be very well controlled even though there is little indication of its presence at the time of spraying. Where ragweed is a problem it would probably be better to delay spraying until the other weeds are in flower bud stage. Ragweed is increasing in Ontario each year and now that 2,4-D has proven to be so successful on it, consideration has been given to organizing a campaign to eradicate it. Not only the fact that ragweed is an impurity in the crop and in seed, but also its health menace to hay fever sufferers increases the importance and urgency of such a campaign being undertaken at the earliest possible time.

One factor which aggravates such a campaign is the presence of ragweed in new seedings of clover. Although it has not been generally recommended to treat new seedings with 2,4-D quite a number report successful weed control with little or negligible damage to the clovers when the clover was Red, alsike, White or Ladino and the rates were kept at the minimum. Although more danage has been reported when alfalfa or Sweet Clover was treated, some have reported success using barely the minimum rates recommened of the amine or sodium salt types of 2,4-D. The time factor is important when treating new seedings and should be timed to treat when the weeds or grain are large enough to offer some protective cover to the clover seedlings. However, if perennial weeds are present, particularly those with underground rootstalks, the low rates would be of little value in controlling them. When no clovers are present and the rate of 2,4-D is stepped up for these weeds the action is very often to kill or stunt the top growth to such an extent that no seed will be produced and little or no competition will be offered to the growing crop. Usually the roots, particularly spreading roots, will still be alive and should be taken care of by after harvest cultivation.

Although we are not making an outright recommendation for the general spraying of cereals seeded down, we believe we have enough evidence to support our contention that, where cereals are seeded to red clover, alsike, white clover, or ladino, susceptible annual weeds may be sprayed with 2,4-D with relatively little damage to the clovers when care is taken to follow recommendations. The chances are that any small amount of damage to the clovers may be offset or more than offset by the beneficial results from controlling the weeds.

In determining the rates of 2,4-D to use it is well to remember that the ester type of 2,4-D generally gives better results than the amine or sodium salt types particularly under adverse conditions such as when a rain falls immediately after spraying, or the weeds are well advanced. Conversely poorer results may be expected when using the sodium salt type and its rate should be increased. The rates recommended are in terms of actual or pure 2,4-D acid per acre. For susceptible annual weeds rates of three to five ounces of ester, four to six ounces of amine, and five to eight ounces of sodium salt are ranges which should prove satisfactory. When the weeds are quite small the lower rates should suffice, but as they become older up to late flower bud stage or with the more intermediate types the higher rate should give satisfactory results. Spraying weeds in the early growth stages is very important in getting successful results. Where perennials such as Canada Thistle, or

Perennial Sowthistle are present the rates should be increased to apply four to eight ounces of ester or five to ten ounces of amine forms. Where cereals are seeded down the amine or sodium salt types are recommended at not more than four ounces per acre.

Costs 10 cents an Ounce

The costs for these rates are roughly in the neighbourhood of 10c. per ounce of the pure 2,4-D acid with the esters generally a little above and the sodium salt a little below. The costs also depend on the quantity bought. But with 10c. per ounce to use as a rough thumb rule the cost of material for spraying annuals would run from about 35c. to around 60c. or 65c. per acre and if seeded down it wouldn't be more than 40c. If perennials are present, the rate would probably be 50c. to $1.00.

I will leave the application of 2,4-D on cereals to Professor Jim Scott, who will be speaking to you next on "Weed Spraying Equipment for Farm Use."

It might be well at this time, to mention the use of 2,4-D on corn. The increase in the use of 2,4-D on corn has been proportionately greater than that on cereals. An estimate of the number of acres of corn sprayed in 1949, would be about half the acreage of cereals sprayed or between 25,000 and 40,000 acres. The total acreage of corn for grain and fodder in Ontario last year was 667,600. This would indicate that approximately 5 per cent of the corn acreage was sprayed.

Recommended rates of 2,4-D for use on corn are similar to those recommended for cereals not seeded down. It is very important that corn be sprayed at about the 6 inch stage since the chances of damage by distortion, bending and breaking become progressively greater as the corn grows taller.

As we look forward into 1950, it appears more than ever that efficiency of production should be the keynote. Attention paid to more of the smaller and finer points of production will be important. In such a program weed control will play a very vital part, and the treatment of cereal crops and corn with 2,4-D will go a long way in accomplishing this end.

A view of one corner at a well organized Seed Fair in 1949.

WEED SPRAYING EQUIPMENT FOR FARM USE

by Prof. J. R. Scott, Agricultural Engineering Department, Ontario Agricultural College, Guelph

WEED spraying equipment has been developed to a high degree by engineers, commercial operators and farmers. Our biggest problem is to sort out the advantages and disadvantages of various distinct types of mounting; sizes of tank; construction of boom; size and type of pump; pattern, number and size of nozzle to perform best for our specific requirements.

To fully outline the multiplicity of designs, sizes and general characteristics I propose to study here some machines that have been developed for the application of weed killing chemicals; to analyse the advantages and limitations of each as applicable to Ontario conditions.

Let us first look at some of the standard machines now offered to the Ontario Farmer.

Slide 1 — Boom Front — Mounted on the tractor with rear mounted tank. Note the simple construction and the features that this design permits.

1. Swinging booms can be folded for travelling.
2. Tractor carries tank and provides power.
3. Either boom section can be operated alone.
4. Pressure gauge easily visible.
5. Pressure readily adjustable.
6. All nozzles in full view — stoppages detected instantly.
7. Full vision for operation of tractor and boom.

This type of equipment has several limitations, however, which should be noted.

1. Limited gallonage can be carried on rear of tractor, reason — tractors designed to be light on front end.
2. Time of setting up, ties up tractor.
3. It is further contended that this type of equipment, in running over the sprayed weeds tends to knock the spray off the leaves reducing the effective kill.

Slide 2 — Cockshutt Design — This is the saddle-bag version of the first machine. It has several advantages; by bringing the load up forward, the load-carrying ability of the tractor is greatly increased and the stability with fully loaded tanks is also improved.

Disadvantages

The main disadvantages are that the operator's vision is obscured as far as nozzles and row crops are concerned. It is further obvious that the folding of the booms for travelling is obstructed requiring a more complicated construction or use of a three piece boom. The mounting of tanks in this position is further complicated by lack of standardization of mounting pads and tool brackets among various makes or even models of tractor. The tractor is even more completely tied up in this mechanism than with a rear tank mounting.

Slide 3 — Experimental Trailer Model — Obviously if we can't find a satisfactory spot on the tractor to mount the tank we can try towing it along behind on its own little two-wheeled trailer. With the boom mounted on the trailer the outfit can be ready to go in a moment and the tractor can be detached and used on other jobs with no delay.

Disadvantages of this equipment are that (1) The operator has to twist around to watch the operation of nozzles (2) The extra wheels do additional damage to field crops (3) The trailer has to be watched in row crop work (4) Extra first cost and maintenance are required for the trailer which with its wide tread is of little value for other jobs.

Slide 4 — Cockshutt Design — A further modification of this idea is to put the boom at the rear of the tank trailer. This leaves the operation of the central nozzles to conjecture. The operator simply cannot see them. However, the advantages of leaving undisturbed spray on the leaves over the full width of the swath may be considered as a compensation. The booms fold forward for transport. The set-up has high capacity in acres per day and is very handy in getting into operation, and also leaves the tractor free for other work.

Slide 5 — Cockshutt Castor-Wheel Trailer Model — This design is a relative newcomer and represents an engineering appreciation of the weaknesses of other designs and an attempt to reduce the costs and awkwardness of the separate trailer.

This is a semi-mounted tank attaching to the tractor drawbar with a couple of bolts — the 70 gallon tank can therefore be handled by the smallest tractor. The castoring wheel supporting the rear of the tank follows the tractor and, for row crop tractors, tracks with the front wheels requiring no watching. The nozzles can be seen and they spray weeds which are not subsequently disturbed. The outfit can be assembled or taken down in a matter of minutes. The construction is not costly and the maintenance should be reasonable. I feel that this design promises to become increasingly popular as it is further developed.

Slide 6 — Hybrid de tasselling Machine — We haven't seen everything yet. This is an adaption for weed spraying in hybrid corn. The chassis is an Iowa State development which carries six men and driver to detassel tall corn in hybrid seed production. It is included here to show that development has not stopped as far as equipment is concerned. Engineers everywhere are constantly evolving designs and improving designs to reduce costs and increase production.

Heart of Outfit

Slide 7 — Farquhar Iron Age Pump — The heart of the spray outfit is the pump and this type might be called the standard type. It has pistons with cup leathers, check valves and conventional cylinders. It will provide adequate volume for any type of weed spraying at any pressure desired and in addition can be used for spraying whitewash, as well as warble fly and horn fly spraying of cattle. This type can also be utilized for spraying insecticides and fungicides on fruit trees, potatoes, etc., although the authorities do not all agree that weed killers can be completely cleaned out once they have been used. However, the versatility of this pump should help it to pay for itself more quickly than some other types.

Slide 8 — Spraymotor Power-Take-Off Piston-type Pump. This is a direct driven power-take-off version of the piston type pump now coming onto the market from an Ontario manufacturer and will bring to many farmers the advantages of a power driven pump to handle whitewash, cattle spraying for horn flies, application of disinfectant and so forth, as well as handling the weed spraying very effectively.

Slide 9 — Oberdorfer Spray Pump — This is the positive displacement, gear pump in most common use on weed sprayers. It features bronze or steel gears, closely fitted in a cast iron or bronze case with a stainless steel drive shaft. It is mounted directly on the P.T.O. shaft and the case is held from turning by a bar or chain engaging the drawbar. The inlet and outlet ports are connected through a valve which can be adjusted to set the pressure at the nozzles. This will handle all liquid weed killers in sufficient volume at suitable pressures for satisfactory work. It will wear out quickly if abrasives get into it. It won't last long if used for whitewash or sprays involving any solids. It is relatively cheap in first cost and can be recommended where a one-job pump is to be used. Capacity should be 4 gallons per minute at 545 R.P.M. at 50 P.S.I. for low volume booms.

Slide 10 — Hanson Gear Pump — This is a large capacity pump of the same type capable of 20 gallons per minute at pressures up to 600 pounds P.S.I. This is useful, I believe, in application of chlorates at low concentration for woody growth and for handling some later nozzle types with which we will presently deal. This pump normally uses a spring type, by-pass pressure regulator to regulate the pressure at the nozzles. This is considerably more accurate than is the by-pass adjustment in the pump case since it is less sensitive to variations in tractor speed.

Slide 11 — Hanson Regulator — This is the regulator used with the pump just illustrated. It is very simple in construction and therefore practically fool proof. It will regulate pressures accurately from 40 P.S.I. to 600 P.S.I.

Slide 12 — Flexrotor Pump — Here is a third, distinct type of pump available for weed spraying equipment; the direct driven or, as in this case, the "V" Belt driven flexrotor pump. This low pressure type of pump uses a rubber impeller or rotor, replacement of which is said to restore the original efficiency of the pump. This would mean that the pump would not be seriously damaged by abrasives and could be used for thoroughly-mixed whitewash. At least the original investment cannot be entirely destroyed by a muddy water supply. A by-pass valve is used to regulate the nozzle pressure with this type of pump.

Nozzles — The nozzle is conceded to be a fairly important element in the sprayer. Other investigators place a great deal more emphasis on the importance of proper nozzle pattern than do Eastern Canadian research men. We usually agree that if all nozzles are clean and spray uniformly and travel at a uniform speed at the proper height above the growth that the application will be uniform and satisfactory. It is interesting to look at the next two slides with this difference of emphasis in mind.

Slide 13 — University of Manitoba Nozzle Testing Table — This is a machine for testing spray nozzles developed at the University of Manitoba. The electric motor draws a test paper along the table at a suitable speed and

under the nozzle to produce a spray pattern fairly representative of that produced in the field when the nozzle passes over weed plants.

Slide 14 — Spray Patterns — University of Manitoba — This is a composite photograph of three such spray patterns. It shows at the top the pattern produced by a high quality fine spray, from one of the popular high grade nozzles. The centre panel shows the pattern produced by a less costly and very popular nozzle. The lower panel is the pattern produced by a commonly used knapsack sprayer nozzle. The moral of this story is that the research men who relied on the knapsack sprayer had better provide themselves with a nozzle of the better commercial type in order to get reliable results.

Slide 15 — Monarch Spray Nozzle — This is a familiar nozzle to most weed spraying operators. Economical, easily serviced and fairly consistent in pattern, they have contributed a great deal to low volume applications. They should be watched closely and be replaced when unbalanced sprays are noted or wear develops.

Slide 16 — Teejet Nozzle — Here is a much more expensive type of nozzle but unquestionably a superior and more consistent performer. Rigid standards of inspection and accurate machining to close tolerances, contribute both to the high costs and precision results. They cost nearly three times as much as the other type shown.

Slide 17 — O.C. Teejet and Boom Jet Arrangement — This is a newcomer to the spraying business but it promises to simplify the whole set-up. The slot is milled off centre to produce a broad fan spray with remarkable carrying ability. Mounted in pairs they do away with the boom and practically eliminate nozzle plugging. The pattern is good. The only requirement is to spray with the wind behind you so that the spray cloud is carried along.

Slide 18 — Boom Jet Spray Pattern — This chart shows the extent of coverage of a single pair of nozzles mounted together. Note that the nozzle mounting is higher than normal which makes the spray pattern susceptible to effects of crosswind.

Acreage Involver

To sum up the weed equipment picture let us put it this way.

Acreage Involved — The size of equipment should be governed by the acreage to be sprayed. We may assume that under ideal conditions a 20 foot boom at 4 miles per hour will cover 8 acres per hour without allowing for mixing materials or clearing stoppages. We can count on 3 to 4 hours of ideal weather conditions per day during weed spraying season. That means bright sun, no wind and high ground temperature. If it is felt that 30 to 35 acres per day is not fast enough or if commercial operations are contemplated, go to a 30 foot boom. The longer boom will require a larger pump and should be equipped with a pressure regulator to ensure uniform delivery pressure and volume.

Type of Weeds to be Sprayed — If chlorates are to be used on woody growth, the large volume pump will be required to handle the low concentrate, high volume spray. It should also be noted that recommendations are now out for lower concentrations on some chemicals; that is, greater than 4 to 5 gallons per acre. To handle large volumes we must either slow down our travel speed

or use larger nozzles and larger pumps to maintain previous speeds with the same booms. This is worthy of thought.

Alternative Uses — A privately owned weed spraying outfit is expensive whatever the price may be, because of the comparatively few days in the year when it can be used. If the equipment can be used for other operations, the number of days of use per year is increased and cost per day of use is reduced. Whitewash, disinfectants, fly sprays and other materials can be applied using piston type pumps. This makes possible many additional days of use throughout the year and serves to spread the cost. I believe this is worthwhile from an economy point of view.

Types of Mounting — If we are operating two or more tractors, it will not be a great inconvenience to mount a boom on one of them for a week or so while weed spraying is in progress. On the other hand the one-tractor farmer is seriously tied up by tractor-mounted booms and tanks. As a result he doesn't get his weeds sprayed in time or rushes the job to get back at other work. He should consider this point when deciding on an outfit and look over the quickly attached and detached trailer models.

Nozzles — The individual operator can hardly go wrong on a flat spray type nozzle from a reputable dealer. On the other hand larger farmers and custom operators will find that the more expensive, high-quality nozzles will more than pay for themselves both from ease of maintenance as well as length of life. It is also certain that if the boom-jet types for low volume field spraying prove to be as good as they appear, the whole design of spray booms will be revolutionized. Simplification and reduced cost will result.

There is still room for development. Here's a couple of ideas:

1. A direct reading speedometer to show tractor speeds as you move along. This will be a great help to uniform application especially in sloping fields.
2. A means of marking the edge of the sprayed area so that overlapping and missing are eliminated. Perhaps a dye can be added to the spray chemical to do this job.

At any rate one thing is definite. As long as there are weeds which should be sprayed and are not, you will find equipment redesigned to fit the purse and the requirement to complete the task.

When you get what you want — when you want it — you don't want it.

SEED SUPPLY

by J. W. Mackay, Chief, Production (Seeds)
Department of Agriculture, Ottawa

ACCORDING to the Quarterly Review of the Dominion Bureau of Statistics, about sixty-three million acres were devoted to the production of field crops in Canada in 1949, with a farm value estimated at $1,427,000,000. The crops listed include spring and fall wheat, spring and fall rye, oats, barley, peas, beans, soy beans, buckwheat, mixed grain, flax seed, shelled corn, potatoes, turnips, hay and clover, alfalfa, fodder corn and grain hay. To ensure and maintain the desired acreage in all these crops an adequate supply of seed is of the utmost importance.

1. Estimated Requirements

Because of the alternative use of some crops for food, feed and industrial use, no accurate estimate of the quantity of seed of such crops produced for planting purposes is possible; this being particularly true with cereal and oil bearing crops. Much of the seed of such crops is, however, grown on the farm or in the community where it will be planted, and in such cases source of supply and distribution in normal years are not a problem. However, in the case of many important crops two distinct groups of farmers are involved: those who produce the seed and those who use it. This is well illustrated in most forage crops on which farmers depend to a considerable degree for winter feed supply and pasturage. It is estimated that about eleven million acres, or about twenty per cent of the field crops grown in Canada, are for the purpose of producing crops of grasses, clover and alfalfa, intended for forage purposes only. A conservative estimate of the amount of seed required annually to maintain that acreage, on a relatively short rotation basis, is placed at twenty-five to thirty million pounds. Eighty-two per cent of this quantity is required in Eastern Canada. Vegetable seeds are another group that usually require an "off-the-farm" source of supply, and necessitate special distribution arrangements. It has been calculated that Canadian requirements of vegetable seeds, including canning and root crops, are approxmately thirteen and a half million pounds annually.

2. Sources of Supply

Broadly speaking there are three chief sources of supply:

Carryover from a preceding crop year;

Current production;

Imports.

(*a*) *Carryover*

Carryover includes stocks in the possession of farmers, or in the hands of the Seed Trade. The amount of seed carried over will vary from year to year, depending upon level of production, demand and the possible intention of the farmer or The Trade to speculate on future needs. A reasonable carryover of all seeds is considered a desirable safeguard against crop failures that periodically occur.

(*b*) *Production*

In the matter of maintaining production at satisfactory levels, it must be recognized that there are important influencing factors. In those crops for

which there is an alternative use, the price relationship is important. Supply and demand play an important part and the hazards of undesirable growing and harvesting conditions cannot be overlooked.

In the production of seed of clovers and alfalfa, the degree of winter killing, seed setting and early frosts are factors that may definitely determine volume. The opinion is held that commercial production of forage crop seeds should be confined, chiefly, to those areas in Canada where continuity of supply can be maintained with a minimum of influencing factors, and where production costs will encourage producers to stabilize production and permit them to sell on highly competitive markets at prices that will ensure a reasonable profit.

(c) *Imports*

It is evident that Canada is becoming more and more self-sufficient in the production of those seeds that can be produced economically and are important to Canadian agriculture. With production on a widely diversified scale, the risk of seed crop failure is minimized to a point where imports have been significantly reduced and, in some years, eliminated entirely. Importation records disclose that, not since 1930, has Canada imported alfalfa seed in commercial quantities. The same applies to red clover seed, with the exception of the years 1931, 1937 and the current year when moderate quantities were, and are necessary to supplement short domestic supply. Of the major crops grown, timothy appears to be the only seed consistently imported in substantial quantities, and on this point something further will be said later.

3. Current Production

(a) *Clover, Alfalfa and Grasses:*

1949 production of these seeds declined considerably in comparison to the record production in 1948. Unfavourable growing weather in the chief production areas, followed by early frosts, did much to reduce yields rather than any plan to reduce acreage. In spite of these conditions, production of most important kinds, with the exception of timothy, brome and crested wheat, was not far below the average for the twelve-year period 1937-48. Supplies from current production, plus carryover and imports, would indicate that there should be a sufficient quantity of seeds of these kinds available to meet domestic needs in 1950, with the possible exception of timothy seed. Timothy seed carryover in both Canada and the United States, as of June 30, 1949, was the smallest on record. Production in both countries declined to an all-time low, and prices have advanced to an all-time high.

(b) *Vegetable and Root Seeds:*

Most kinds of vegetable seeds, with the exception of beans, peas and corn, showed some increase in production over 1948. A sharp decline in production in peas of canning varieties occurred, due to a large surplus of seed stock produced in 1948. The vegetable seed industry in British Columbia has cut back production on those items which, in recent years, were produced for export. The spectacular recovery of vegetable seed production to a prewar level in traditionally producing countries in Europe and the currency problem are largely responsible. Adequate quantities of vegetable seeds are assured to fulfil 1950 requirements.

(c) *Cereal and Other Seeds Eligible for Registered and Certified Grades:*

There was a marked decline in the 1949 production of Registered and

Certified crops of oats, barley, flax and peas. This decrease, based on crop inspection estimates, is placed at about one-third or six million bushels less than in 1948. Most of this reduction has taken place in Western Canada, partially planned, due to anticipated decreased export demand for seeds of these kinds, but also due to drought and early frosts particularly in Alberta. Production of seed of these crops has been maintained in Ontario and other parts of Eastern Canada, with the exception of barley the production of which was cut about fifty per cent in Ontario to an estimated amount of 80,000 bushels.

In spite of these sharp reductions, there are adequate quantities of these seeds available for use in 1950.

4. Current Imports

As already stated, the domestic production of timothy seed is insufficient to meet 1950 needs, and supplies from elsewhere are necessary. During the period July 1 to December 31, 1949, 2,237,405 pounds of timothy seed have been imported. Most of this seed has been obtained from the U.S.A., and, because of short supply in that country and currently high prices, Canadian seedsmen have been somewhat reluctant to import, believing that farmers next spring will not use normal amounts. As other grasses are not available, except at comparably high prices, there would appear to be no basis on which to suggest suitable substitutes.

As red clover seed production in 1949 was only one-third of the record sixteen-million-pound crop of 1948 and twenty per cent less than the twelve-year average, importations of this seed are being made for the first time in twelve crop years. During the period July 1 to December 31, 1949, 1,593,650 pounds of red clover seed have been imported from the United Kingdom.

Apart from timothy and red clover seed, no significant importations of any other forage crop seeds grown commercially in Canada are anticipated.

5. Current Exports

The heavy demand for Registered and Certified grades of wheat, oats, barley, flax and other oilbearing crops, to countries that are not traditional purchasers, has diminished appreciably, as anticipated.

Had production of small seeded legumes and grasses been maintained in 1949, at, or near, the 1948 level, there is little doubt that such a surplus would have found a ready market in the U.S.A. Because of lower production of these seeds in 1949, exports during the current year will be far less than a year ago when all-time export records were established for seeds of alfalfa, sweet clover, alsike, red clover, brome, meadow and creeping red fescues. An impressive total of almost 75,000,000 pounds of forage crop seeds, with an estimated farm value of about $17,000,000, was exported during the twelve months ending June 30, 1949, and over 90 per cent of this amount went to the U.S.A.

6. Production Forecasts

Concern is being expressed at the present in respect to over-production of some agricultural products, and farmers generally are taking stock of their position. Those farmers who are engaged in the production of forage crop seeds should not feel apprehensive about the immediate future, and a cut-back in

production of such seed crops would not be justified. On the contrary, the production of some of these seed crops should be stimulated. Several references have been made to a shortage of timothy seed. The records indicate that for many years Canada has depended upon the U.S.A. as a source of supply of considerable timothy seed, and in the past this has been justified, apparently due to low production costs in that country. However, during and since the war, there has been a marked decline in timothy seed production in the U.S.A. and the 1948 and 1949 crops have averaged forty-three per cent less than the 1943-47 average. In the chief timothy seed producing states, Missouri and Iowa, acreage harvested for seed has been reduced significantly because producers have turned to other crops as offering a greater cash return per acre. What effect the abnormal prices offered for seed from the 1949 crop may have on production in 1950 is unknown, but according to officials of the U.S.D.A., the cut-back in acreage that has taken place in the past few years would indicate a 1950 production of less than average. On the basis of this information, it would seem desirable and necessary that producers in Canada increase production of timothy seed, not only as a means of increasing supplies for domestic use but to be in a position to export to the United Kingdom where the use of timothy seed is definitely on the increase.

The Soil Conservation and Crop Conversion Programs in the U.S. are stimulating the use of small seeded legumes and grasses. The seed production

Trophy Hall was a new feature at the 1949 Royal Winter Fair. These three panels show World Grand Championship exhibits in rye, potatoes and wheat.

of a number of these kinds in that country is, at the present time, inadequate to meet domestic demands. Canada is benefiting by that situation, and should have no difficulty in disposing of surplus seed of the kinds that will fit into those programs. Eventually the increased use of grasses and clover in the U.S. may stimulate seed production of these crops to record levels, because every acre seeded will have potential seed production possibilities.

In the meantime, however.. there seems to be every reason to believe that Canadian producers of forage crop seeds should make every effort to take advantage of what appears to be, for a few years at least, a satisfactory market. In the Old World, sod crops as soil builders have been recognized as essential to good agriculture for many years. In Canada and the U.S. this has not heretofore been fully appreciated. However, present trends would indicate an appreciation of the need for soil building and soil conservation programs that should increase consumption in both countries of seeds of appropriate grasses and clovers.

NEW DEVELOPMENTS IN FIELD HUSBANDRY

by Dr. G. P. McRostie, Department of Field Husbandry, O.A.C.

WEBSTER'S dictionary gives one interpretation of the term "husbandry" that I think comes rather close to the general sense of the word: "To manage thriftily" is the meaning to which I refer. If we manage our soils. crops, and livestock thriftily we will be getting the most out of all three.

There has been a tendency in recent years to exploit the term "conservation," and to think of it in Ontario at least largely in terms of drainage, contour ploughing and reforestation. While these practices are very important. they do not tell the whole story, nor will they in themselves solve our problems.

Conservation is community betterment, and should embrace all factors which aid in bringing about better living conditions for people in general. Thus, accompanying drainage, contour ploughing, and reforestation, there must be suitable crops, good cropping practices and satisfactory livestock and poultry management. Education, too, is a prime factor in developing such desirable conditions.

At this time it is not my purpose to discuss this problem as a whole, but rather to indicate to you something of the plans that are being undertaken in Field Husbandry to help out in the general scheme.

Perhaps one of the most significant things in present developments in Field Husbandry is a general realization that our endeavours are a part of a broad scheme of community betterment and not an end in themselves. An example from our winter wheat improvement activities will serve to illustrate my point. It is not enough to produce or secure a new wheat that will outyield our present sorts at our central breeding station, but it must be tested as to its suitability for the whole winter wheat area of Ontario. It also must be rigidly tested for its milling and baking qualities so that it will meet the demands in this connection. It will thus bring profit and satisfaction to the grower, miller, baker, and ultimate consumer and enhance the reputation of our wheat and flour in foreign markets.

The same type of consideration is being given all other cereals that enter into our breeding program. All of our new productions in barley are tested extensively for malting quality as well as for their ability to resist the attacks of the most destructive diseases. Studies are being undertaken on the mode of inheritance of resistance to disease so that we may follow the most effective procedure for producing resistant sorts.

Throughout our quality testing very much smaller apparatus than used commercially has been developed to permit of testing small quantities. Thus we can get accurate information about our new productions in early generations. This saves both time and money.

Let us turn now for a short time to the improvement of forage crops. The trend in breeding of these crops has changed very definitely in several regards. Pounds per acre used to be the objective, but now our aim is food units per acre. Our new productions have to pass through critical tests for nutritional value. One of the interesting developments in this connection is the wide variation that occurs in the strains of a single species with regard to various plant food elements.

The second trend is one of equal importance. That is the effect of the various kinds of forage crops on soil improvement. Because we cannot see what is happening underground, we are apt to disregard that phase of crop development. Not only do plants vary widely in the plant food that they add to the soil, but they differ in their contribution to its fibre content.

I want to present for your information a table which reports the results of some recent investigations at an American experiment station.

TABLE I

AVERAGE WEIGHT OF ROOTS IN POUNDS PER ACRE INCH AT VARIOUS DEPTHS

Grass	Depth in Inches				
	0–3	3–6	6–9	9–12	12–18
Awnless Brome	719.7	200.8	140.5	123.6	106.4
Orchard	1,246.9	124.2	76.6	50.9	29.6
Kentucky Bluegrass	1,126.1	84.8	53.3	6.5	3.3
Timothy	680.1	40.6	19.7	12.4	6.3

Here we see a very definite difference between four of our commonly grown grasses with regard to the amount of root growth left in the ground at various depths. Not only do variations such as this exist between species of grasses and legumes but smaller significant differences occur between different varieties and strains of single species. Such differences are being recorded and given recognition by our plant breeders.

There is a further trend, which we might term "the shape of things to come," that is entering into our legume breeding program in particular. This is the application of the hybrid corn idea to various legumes which lend themselves to such treatment. I can illustrate my point best by reference to the following table which records the Guelph results of the North East Regional

Alfalfa Tests. The figures presented are for one year only and for a year of rather low production. However, they indicate an interesting trend in breeding:

TABLE II

PERFORMANCE AT GUELPH, ONT., OF THE VARIETIES INCLUDED IN THE INTERNATIONAL NORTHEAST REGIONAL ALFALFA TEST IN THE 1949 CROP YEAR

Variety of Strain	Dry Fodder Tons per Acre
A.22 a Utah	3.18
77 C 231 Nebraska	3.10
77 C 129 Nebraska	3.06
75 C 53 x C 130 Nebraska	3.05
Ladak F.C. 23279	3.03
67 C 126 Nebraska	2.98
A 225 Utah	2.87
Narragansett F.C. 23413	2.76
Atlantic F.C. 23413	2.63
O.A.C. No. 1	2.60
No. 74 Utah	2.60
No. 200 Utah	2.53
Syn. C. Wisconsin	2.51
Buffalo F.C. 23391	2.46
Ranger F.C., 23150 Arizona	2.45
Kansas Common 23391	2.43
Williamsburg, F.C. 23349	2.42
Ranger, F.C. 23349	2.42
Oklahoma Common F.C. 23370	2.40
Ontario Variegated	2.39
Cossack	2.38
Grimm F.C. 23163	2.28
Ferax	2.10

It will be noted that the varieties fall into three general groups according to the figures for yield. The lowest yielding group consists of the older varieties under test. The larger middle group presents improved strains. Our own O.A.C. No. 1 is well up in this group. The highest yielding group with one exception is composed of hybrids produced in somewhat the same manner as hybrid corn. At the present time anyway this last group looks to represent the goal towards which our energies as plant breeders should be directed if the maximum profit is to be secured from our alfalfa and red clover breeding and perhaps some other legumes as well.

This approach coupled with an even more recent one of improvement by doubling of the inheritance factors by the use of chemicals such as colchicine presents possibilities of improvement of forage crops greater than any yet attained by the older methods.

The corn breeding program has almost entirely centred around the production of improved types of hybrid corn. This scheme has been proven so profitable and satisfactory that the open fertilized varieties are rapidly disappearing from seed corn markets.

The situation has become so serious that the plant breeding institutions of Canada have been requested to assume the responsibility of keeping the main existing open-fertilized varieties in a pure form. A definite group of

varieties has been assigned to each institution concerned. Thus we hope to retain for future breeding purposes the desirable factors possessed by our open fertilized varieties.

In the instance of soybeans, a study of cultural practices has been very closely associated with the development of improved varieties. The fact that the soybean acreage has increased nearly one thousand per cent in the past twenty years is a good indication that a series of conditions have made the production of the crop in question, a profitable venture for many farmers. A ready market at improved prices has been an important factor, but the production of suitable varieties for each soil climatic zone has been equally valuable. Changed cultural practices as a result of experimentation has been of the outstanding developments. For example, it has been proven that yields can be stepped up from eight to seventeen per cent, depending on soil type and fertility, by inoculation every time the crop is grown. Narrowing the distance between rows and increasing the rate of seeding to at least a bushel per acre has resulted in increased yields of from twelve to twenty per cent. Weeds have always been a potent factor in lowering soybean yields. However it has been proven that not over three cross cultivations after the soybeans have emerged and while the weeds are still small, coupled with one or two inter-row cultivations, will give a comparatively clean crop on the average farm. The implements used were the rotary hoe, the finger weeder and the ordinary drag harrow. The first-mentioned implement can be operated effectively either across or in the same direction as the rows. However, it needs to be pulled at the rate of eight or nine miles an hour for the most effective results. The finger weeder seems to give better results when used across the rows, and at speeds of four or five miles an hour. The drag harrow gives good results when operated across the rows and at three or four miles per hour.

The potato crop has received its share of attention during recent years. A rather extensive program is under way with regard to both breeding and cultural practices. This is a co-operative venture between the Dominion and the Provincial Departments of Agriculture. At the present time the most emphasis in breeding is being placed on the production of disease-resistant types with satisfactory agronomic characteristics. Very distinct progress has been made in this regard in both securing and producing scab resistant and light-resistant sorts. As far as scab resistance is concerned the imported Ontario variety seems to be one of the most promising for a number of our potato growing areas in Central Ontario.

Accompanying the breeding program, rather extensive nutritional studies are being undertaken. The object of these is to determine the effect of various cultural practices on the yield and quality of the varieties concerned. There are still so many unknown factors in the production of a satisfactory crop of potatoes, that each little bit of information secured by observation or experiment keeps adding to the possible profits from this crop.

I have referred specifically to a sufficient number of field crops to indicate the trend in this regard. The same general line of improvement is being followed with practically all field crops of agronomic importance. In addition, extensive importations are being made from many parts of the world to see if some new crop or an improved variety of any established crop can add to the profitableness of our Ontario agriculture. Over six hundred such introductions were made during the past year by the Field Husbandry Department of the O.A.C.

alone. Thus introduction, breeding, and studies of cultural requirements form the bulwark of our crop improvement program.

Finally, may I digress a moment to answer a frequent question in connection with our crop improvement activities. The query is "Does such work pay?" Such factors are becoming of increasing importance.

I have been speaking of winter wheat, and I will use this crop again as an illustration. In any crop improvement endeavour the first step is to secure all promising varieties from sections of the world known to possess growing conditions similar to the area in which the crop is to be grown. This was done with winter wheat, and among those secured was a selection, No. 595, from Cornell University, Ithaca, N.Y. A few years' testing showed this variety as quite resistant to loose smut and also high-yielding and of excellent milling and baking quality. It was considered sufficiently good to replace the commonly grown varieties until such time as our newer hybrids would be ready for distribution. The use of this variety has increased so rapidly that, according to the best estimates we can get this year, around one-half our winter wheat acreage, or 400,000 acres, was planted to Cornell 595 this past fall. Our average increase per acre over the check varieties has been two-and-one-half bushels where no smut was present. Much greater increases were secured where loose smut was present in quantity. However, using the lowest figure of

Exhibits are shown to good advantage at the Seed Show, Royal Winter Fair — Ontario growers won many high awards.

two-and-one-half bushels on 400,000 acres the total increase that can be expected due to the use of Cornell 595 is around 1,000,000 bushels. At current prices for winter wheat this amounts to early a million and three-quarter dollars. This is more money than has been spent on winter wheat improvement in your life-time or mine, and is the result of one phase of improvement with one crop for a single year.

According to the Statistics Branch of the Ontario Department of Agriculture, there are around ten million acres devoted to field crops in the province. A very small increase per acre, due to the introduction of a new variety or an improved cultural practice, returns big dividends. Dollars spent in this connection are returned a hundred fold. Yes, there is money in crop improvement.

Courtesy of Farmer's Advocate

THEY ALL HAD A PART IN THE POTATO MEETING AT TORONTO

Sitting, from the left: Howard Harper, Goodwood, Chairman of Resolutions Committee, Potato section of Crop Improvement Association Convention, Toronto; A. L. Deachman, Toronto, Guest Speaker at Potato Growers' Banquet. Standing: A. H. Martin, Secretary, O.C.I.A.; Roy Hickling, Barrie, Chairman of afternoon session; A. H. McNish, Lyn, President, O.C.I.A.

POTATO MEETING

REPORT ON RESOLUTIONS AND COMMITTEE FOR 1949

Howard Harper, Goodwood

Resolution 1—*Courtesy*

Resolution 2—*Appreciation Conveyed*

Resolution 3—*Scab Control Project*
Work continued and enlarged as requested.

Resolution 4—*Freight Assistance on Seed*
Assistance provided as suggested to include area north of North Bay.

Resolution 5—*Enforcement of Grade Regulations*
Staff enlarged — much educational work — many detentions and prosecutions.

Resolution 6—*Faulty Germination*
Tests undertaken — no solution determined.

Resolution 7—*Freight Assistance*
Granted as requested.

Resolution 9—*Bacterial Ring Rot*
Survey enlarged to cover area.

Resolution 10—*DDT*
Tests undertaken — reports negative to date.

Resolution 11—*Grade Enforcement*
Similar to No. 5. Progress made.

NORTHERN ONTARIO SECTION

Resolution 1—*Storage for Temiskaming*
Assistance available but no further request from growers.

REPORT OF POTATO COMMITTEE

FIRST of all, we express regret that during the year one of our valued members in the person of A. V. Mason, Dundas, passed away on June 13. He was well known as a potato grower (75-100 acres) and as a buyer, but his interests extended far beyond potatoes, through county and provincial organizations. As one of the founders of Alcoholic Anonymous in Ontario, he provided invaluable assistance to many in building stronger characters. No one but Albert Mason will ever know the patience and many hours he spent in the interests of others.

As a member of our Committee, he was always interested and active. His opinions were expressed freely, his advice appreciated and his company enjoyed. As he passed away, his field of potatoes behind his house was almost in full

bloom. Albert Mason had grown early potatoes on that same field annually and continuously for over thirty years, but he did not rob the soil, rather by his good management the soil was improved. That was typical of Albert Mason. He always had a high objective — he put a lot into any project but he got a lot out — he wanted to get at basic and fundamental principles. He liked to see things flourish and do well. He left the world a better place in many respects, because he lived. We will all miss him very much.

Business at Committee meetings during the year consisted of plans and results for many projects. These meetings acted as a clearing house for all matters pertaining to interests in production and marketing of potatoes. They also gave growers from the various areas opportunity to discuss business pertaining to potatoes from all angles, and if considered advisable, take action. Membership was continued in Canadian Horticultural Council, and problems of a national scale were dealt with through that organization.

Support Prices

A committee meeting in Ottawa was attended with the Secretary on September 19, and after discussion with representatives of all Eastern Provinces all supported the following recommendation on the basis that anything that would assist Maritime Potato Growers, automatically assists Ontario.

It is recommended —

1. That there be price support on a basis not lower than that of 1948.
2. That price support be announced with the least possible delay.
3. That applications for price support should be received on and after January 15, 1950.
4. That price support should be applicable to all commercial growing sections in the Maritime Provinces.
5. That price support should be applicable to potatoes in farmers' bins or in rented storage elsewhere.
6. That the official press release announcing price support for potatoes should include a statement of the beneficial effect which it will have upon other producing areas.

It was pointed out this year's Ontario crop amounts to 117,000 acres with average yield of 160 bushels per acre. As compared to 115,000 in 1948 with average yield of 177 bushels. P.E.I. is up to 13%, N.S., 3% and N.B. down 8%. Movement to December 1, from the Maritimes for export and domestic use, 9199 carloads and 1324 carloads above last year at same date. Quota of seed and table stock to U.S.A. of 3½ million bushels filled by November 27 this year, about a month later than 1948. Full duty 75c. per cwt. now applies.

U.S.A. support price varies — for N.Y. state, per cwt. November $1.90, December $2.10, January $2.30, Feb. $2.35, March $2.40. Maine is 20c. lower in each case. These are based on 60% parity as compared to support prices at 90% parity in 1948. Acreage was reduced up to 26% in some States. Production goal in U.S.A. for 1950 is set at 335 million bushels, enough to provide a per capita supply of 100 pounds as compared to 103 pounds now reported as per capita figure for 1948 crop.

High Yield Clubs for 1949

By Area:

	County or District	No. Completing Contest	Over 400 Bus.	Over 500 Bus.	Over 600 Bus.	Over 700 Bus.	Over 800 Bus.	Average Bus. per Acre
1.	Algoma	17	10	1	......	......	......	394
2.	Cochrane	19	14	7	3	1	......	460
3.	Dufferin	40	28	9	......	......	......	433
4.	Durham	30	14	6	......	......	......	419
5.	Grenville	17	......	......	......	......	......	257
6.	Kenora	10	......	......	......	......	......	282
7.	Middlesex	34	22	14	11	3	1	487
8.	Ontario	18	10	......	......	......	......	366
9.	Parry Sound	18	9	5	3	2	1	445
10.	Peel	13	5	2	......	......	......	375
11.	Rainy River	9	4	1	......	......	......	316
12.	Renfrew	12	3	1	......	......	......	342
13.	Sudbury	20	10	3	......	......	......	390
14.	Sudbury (Walford Div.)	14	5	2	1	......	......	367
15.	S. Simcoe	33	5	......	......	......	......	321
16.	Temiskaming	10	1	1	......	......	......	283
17.	Thunder Bay	17	5	3	2	1	......	350
18.	York	19	11	5	1	......	......	432
	Totals	350	156	60	21	7	2	373 Avr.

By Year:

	No. of Clubs	No. Competitors Completing Tests	Over 500 Bus.	Over 600 Bus.	Over 700 Bus.	Over 800 Bus.	Average Bus. per Acre
1943	2	36	3	......	......	......	......
1944	11	194	17	4	......	......	330
1945	12	207	3	2	......	......	266
1946	15	282	52	6	......	......	379
1947	16	275	41	12	1	......	392
1948	21*	394	69	18	2	......	392
1949	18	350	60	21	7	2	373

*With N. Simcoe.

At least seven clubs awarded their prizes on a *quality* basis, and at least ten clubs organized well attended banquets of potato growers. Many featured prizes for exhibit, and the original South Simcoe Club continued their awards for condition of potatoes in storage. Eight Gold Watches were given away, and total prize money would aggregate around $4,000, presented at public gatherings with an estimated public attendance from 1,800 to 2,000. Certificates of Merit were again provided to growers reaching the objective of 500 bushels per acre.

The Championship Award for Ontario was decided at the Royal Winter Fair, where 39 growers made entry in the final contest for Provincial honours, based on 200 points Yield Per Acre: 200 points Quality Per Acre: 100 points Exhibit of One Bushel: 100 points Cooking Test for Quality.

Top awards were as follows:—

1.	Frank Rick, Trout Creek, Parry Sound Dist.	$250 in cash plus trophy and trip to Toronto
2.	Dave C. Hackett, Cochrane, Cochrane Dist.	125 in cash
3.	W. A. Vail & Son, Denfield, Middlesex Co.	75 in cash
4.	Ivan Linton, Strathroy, Middlesex Co.	40 in cash
5.	Egan D. Anderson, Cochrane, Cochrane Dist.	25 in cash
6.	Jos. Gattie, Walford, Sudbury Dist.	15 in cash
7.	W. Irwin, Magnetawan, Parry Sound Dist.	10 in cash
8.	Alfred Anderson, Cochrane, Cochrane Dist.	10 in cash
9.	Herb Jones, Maple, York Co.	Ribbon
10.	Gabriel Kolometz, Dunning, Cochrane Dist.	Ribbon

As the years go by, it is interesting to observe long term effects of these high yield potato clubs. Two or three important practical features are noticeable.

1. High yields per acre cut production costs per unit and usually improve quality.
2. Improved crops of grain, hay and pasture are being obtained on "built up" land, following potato crops, thus potatoes improve the soil when handled properly and account for the noticeable benefits being obtained by way of soil conservation in a very practical manner.
3. By a competitive spirit of friendly rivalry, growers have become acquainted with each other — their problems — their practices — not only on a community basis but the wider field of county and provincial.

KING OF 'EM ALL

Sudbury Rotarians honored seed potato-grower of the Royal Winter Fair. Grand Champion Theodore Despatie was "crowned" Potato King by Dr. R. C. Chappelle, president of Sudbury Rotary Club. Mrs. Despatie is seated beside her famous husband, while the Rotary sergeant-at-arms stands at rear.

Enthusiastic interest is at an all-time high, but Ontario has a long way to go yet TO STRICTLY ENFORCE GRADES — to provide constant supplies of a quality product which will please the consumer not only from outside appearance, but give them mealy, white potato flavour that will increase consumption and justify the establishment of an advertising campaign under improved merchandizing practices.

Bacterial Ring Rot Survey

GENERAL SUMMARY

Since Regulations

	Infested — Farms	Infested — Acreage
1943	157	1,200
1944	463	2,800
1945	281	1,200
1946	673	3,640
1947	351	1,900
1948	246	1,200
1949	590	2,850

By Counties and Districts

Area	1943	1944	1945	1946	1947	1948	1949
Algoma	....	....	....	1	7	....	....
Brant	....	2	....	17	1	3	3
Bruce	....	....	....	1	....	....	....
Carleton	....	9	....	44	6	13	26
Cochrane	....	....	1	1	22	20	45
Dufferin	61	78	15	34	7	11	217
Dundas	....	....	....	1	....	....	....
Durham	7	22	10	41	6	4	70
Elgin	....	....	....	1	....	....	....
Frontenac	....	....	....	....	....	1	....
Grenville	....	....	1	....	3	2	1
Grey	....	2	....	....	....	....	1
Halton	....	1	....	....	....	....	....
Huron	....	1	....	....	....	....	....
Kenora	1	....	....	1	....	....	....
Lincoln	....	1	....	....	....	....	....
Middlesex	....	6	5	5	....	....	4
Muskoka and Parry Sound	....	1	....	....	2	....	2
Nipissing	....	1	....	11	....	....	....
Norfolk	1	....	....	1	....	....	....
Northumberland	....	....	....	6	2	1	7
Ontario	7	2	3	33	8	21	30
Peel	8	13	22	2	1	3	5
Perth	....	1	....	....	....	....	....
Peterborough	....	1	....	1	1	....	....
Prescott and Russell	....	5	6	24	2	12	13
Rainy River	....	....	....	3	....	....	....
Renfrew	....	1	....	2	1	3	7
Simcoe	58	171	62	178	108	100	91
Sudbury	1	54	122	183	128	21	25
Temiskaming	1	....	....	2	3	1	....
Thunder Bay	....	....	2	23	21	1	6
Waterloo	....	13	1	8	....	12	2
Wellington	4	46	5	16	15	1	2
Wentworth	1	12	1	15	1	5	1
York	7	21	7	15	....	11	32

Upon receipt of "positive" report, each grower on this list was mailed a registered letter, advising that regulations respecting Bacterial Ring Rot passed

under the Plant Diseases Act. must be complied with. They are briefly as follows:—

1. Dispose of all potatoes by January 31, 1950.
2. Mark each tag with "Table Stock Only."
3. Disinfect all bins, machinery, bags, etc., by April 1, 1950.
4. Secure new seed from approved source.
5. Make a detailed report to head office.

Royal Winter Fair

From a total of 359 entries from all Provinces in Canada, except Newfoundland, and ten states of the U.S.A., Ontario growers won 141 prizes including:—

Grand Championship in Seed Potatoes — Theodore Despatie, Hanmer, Sudbury District
Championship in Table Potatoes — Arthur H. Budarick, Palmer Rapids, Renfrew County
Reserve Championship in Table Potatoes — Frank Rick, Trout Creek, Parry Sound District

ONLY ONE WAY OF ESCAPE FOR WESTERN CIVILIZATION

A. L. Deachman Depicts The Terrors of Atomic Warfare before Potato Growers

GRIM and depressing was the prospect which Mr. Alex L. Deachman of Toronto, portrayed to the Eighth Annual Potato Growers' Luncheon held at time of the Crop Improvement meeting in the Coliseum, Toronto. His subject was "Atomic Energy, for War and Peace." Mr. Deachman gave a terrifying picture of the probable effects of atomic warfare. He scoffed at the idea that Russia did not possess the secret of the atom bomb, which they had secured from the Germans, who were only three months behind the Allies in Atomic research. He pictured both sides with rocket bombs, spear headed with atomic explosive and guided by radar and with a range of thousands of miles. He described the devastating effects of such weapons, a thousand times more powerful and deadly than those which destroyed Hiroshima and Nagasaki. He told how simply these deadly missiles could be fired. He quoted authorities for believing that the use of these bombs would result in the total elimination of the chief cities and a large majority of the population of the contending nations. Finally, he advanced the opinion that there was only one power that could save civilization from destruction, the Master of the Elements who on the sea of Galilee said "Peace be still," and there was a great calm. And he pleaded earnestly that the intervention of Almighty Power should be invoked through the instrumentality of prayer. The address made a very deep impression indeed on the 400 or more people who heard, and will probably affect the future thinking and attitude of many of them.

Experiments by Dr. Rutherford in 1925, and later by Doctor Lawrence, led to the knowledge that the atom could be split, thereby releasing a tremendous energy at the disposal of man. While photographing atoms of uranium and radium placed in a lead box, Dr. Rutherford found that the atom was not simple as supposed, but was composed of a central nucleus around which revolved a series of electrons, neutrons and protons.

Dr. Rutherford furthered his experiments by photographing atoms of other elements, and found that the atom was not the smallest particle of matter, as previously believed, but that it was composed of a neucleus, with other

elements revolving round it. This disproved the Valancy Theory, that all elements could be reduced to a pure form of matter and were found by weight to be exact multiples of the weight of oxygen. In 1934, Canadian-born Dr. Lawrence began experimentation based upon the theory that if it was possible to impregnate the atom with some other particle, balance in the atom would be destroyed and it would therefore burst and divide. The race for atomic power started when Dr. Lawrence successfully split the atom with an immense electro magnet or cyclotron.

In July, 1945, by means of remote control the first atomic bomb was exploded in the Arizona desert. Scientists stationed twenty miles away watched the orange flaming ball-like mass which rose in the air, leaving a column of smoke much like a mushroom and heard the tremendous explosion, the effects of which were recorded in Paris.

Later, it was found that the sand for one mile in diameter was instantly turned to glass by the three hundred billion degrees Fahrenheit temperature at which the bomb exploded. The earth was pushed down for a depth of ten feet, streams broke out in the desert, and all life was destroyed.

The first atom bomb used in warfare was dropped on Hiroshima, a city the size of Hamilton. Five square miles in the heart of the city were absolutely wiped out, and the loss of human life was 130,000. Those who escaped destruction by the bomb were affected in other ways. Men became sterile and women gave birth to children who were mentally deficient. The atom bomb which caused this destruction weighed less than 300 pounds and had an actual explosive charge of less than four and one-half pounds of uranium.

Scientists agreed that it would be foolish to assume that Russia is not making atom bombs, for German scientists were within three months of completing plans for the atomic bomb when Allied forces invaded Europe. As the Russian army rolled into Germany from the east, the scientists engaged in atomic research and the equipment located in this area to further such research, disappeared. It was probably that they were in Russia today, perfecting the atom bomb for that country. The speaker suggested that the Russians took over Chekoslovakia at the possible cost of war because they needed the Skoda factories there for the production of atom bombs.

Dr. Deachman visualized the third world war as a push button war, in which radar controlled rockets shot far into the stratosphere, could home on targets from any part of the earth's surface to another, and hit their mark to within one square mile. Einstein has said that in such a war, three per cent of humanity only would survive. Another scientist estimated that only ten per cent of the world's population, the primitive peoples living in sparsely inhabited parts of the world, would survive a war of this nature.

Atomic bombs could annihilate all life on earth, but if war was avoided and banished, atomic energy would open the door to a way of life which would make all present conceptions of daily living obsolete. Human life could be prolonged indefinitely by the use of atomic energy to cure maladies which shorten the life span, and the harnessing of atomic energy for industrial purposes would completely revolutionize industry. A process of releasing atomic energy from mercury has been perfected whereby a teacupful of mercury will provide sufficient power to propel a locomotive drawing 120 loaded freight cars, across the continent 45 times and at a speed of 237 miles per hour.

Mr. Deachman said that the sun was atomic power in action, and that man grew old, and died because of exposure to its cosmic rays. Prior to the great flood it was recorded that men lived to be nearly 1,000 years old. That had been questioned but it was also noted in the scriptures that at this point in the world's history there was a curtain of moisture over the earth. This protected man from the sun's injurious rays. Scientists were of the opinion that there was nothing in man's makeup to prevent indefinite life and it was not fantastic to conceive that, with the advent of atomic energy to place a canopy over the earth which would shelter man from cosmic rays and render life to 1,000 years possible.

"It would seem that the human race is on the brink of a golden age such as the Bible predicted — yet stands on the brink of complete destruction if the atom is used for war rather than for peace," said Mr. Deachman. The chaos and unrest in the world were attributed to the fact that it has never had the correct type of governor.

Neither the despots of ancient civilizations, nor the dictators of the modern age, nor the international organizations such as the United Nations had been successful in establishing world order.

Mankind must realize that there was a power greater than the atom — that Jesus, who stilled the waves on the Sea of Galilee, was the one man, who had controlled nature's forces. In Him, was the one power competent to step into the world today and say, "Peace Be Still." The power of prayer, the heart's desire sincerely expressed, could be a major factor in bringing about world peace.

Mr. Roy Hickling, Barrie, thanked the speaker for expounding in plain terms a technical subject which is of utmost importance in the world today, affecting as it does the future of the entire human race.

Courtesy of Farmer's Advocate

THE POTATO KING AND HIS FAMILY
From left, Roger Despatie, Mrs. Theodore Despatie, Lucien Despatie, and Theodore wearing his crown.

POTATO COSTS PER BAG

by Dr. H. L. Patterson

THE FIRST information on potato costs which the Farm Economics Branch had available was the cost statements turned in by the "500" Bushel Potato Clubs of the Crop Improvement Associations.

A summary of those reports from 1944 to 1947 indicates that it required an average of 122 man hours per acre, 7 tractor hours and 65 horse hours per acre of potatoes. In addition to that there were 11 loads of manure applied, valued at $19.; 943 pounds of fertilizer costing over $16., spray or dust costing nearly $9., and seed was valued at $36. per acre. At 25c. an hour for horse labour the cost would be over $16., and at $1.50 per hour for tractor and implement, the cost would be $10., an acre. The land itself will cost somewhere above $3. per acre including interest and taxes.

What I am getting at, is that potato production involves a high cost per acre. Even without the 122 hours of labour the cost would be over $120. per acre. Even with the lowest farm wages paid for this type of work the costs will run somewhere over $180. per acre on farms striving for good yields. With cost this high, one cannot afford to obtain anything but good yields.

The average yield obtained was 236 bushels or about 189 bags per acre. On this basis it looks as though about one-third of the potato growers would be losing money; about one-third break even and about one-third clearing good net returns. The yields ran all the way from less than 150 bushels per acre to over 400 acres. The yields ran all the way from less than 150 bushels per acre up to over 400. The yield was related to tractor time used but not too closely to man labour or horse-time. In other words, the best yields were obtained by the operators who had the most modern equipment and who were able to keep down the working time by the use of that equipment (Table I).

TABLE I

RELATION OF MAN, HORSE, AND TRACTOR TIME TO TOTAL YIELDS OF POTATOES

(Based on Records for Crop Years 1944–1947 for Province, except Northern Area)

Grouping (by Total Yield in Bushels per Acre)	No. of Farms in Group	Average Yield per Acre	Man Labour		Horse Time		Tractor Time	
			Aver. per Acre	Hours per Bushel	Aver. per Acre	Hours per Bushel	Aver. per Acre	Hours per Bushel
		(Bus.)	(Hrs.)	(Hrs.)	(Hrs.)	(Hrs.)	(Hrs.)	(Hrs.)
Less than 150 bus.	24	120	115	1.0	70	.6	3.6	.04
150 to 199	33	168	101	.60	68	.4	6.1	.04
200 to 249	40	219	127	.58	70	.3	6.4	.03
250 to 299	36	265	106	.40	62	.2	6.7	.02
300 to 349	23	317	145	.46	86	.3	6.9	.02
350 to 399	22	364	120	.33	67	.2	9.7	.03
400 and over	24	491	98	.20	42	.08	13.4	.03

It is evident that potato producers have learned that lesson since 1947. A study of complete costs on potato production was started in 1949. The data is not complete yet but 117 farms kept data on all operations which have been summarized up to the end of planting operations. Since these farms are

similar in type to the "500" Bushel Club farms — in fact many are the same farms — their time requirements are comparable with the original group studied. In the field operations summarized to date, it was found that the tractor time per acre has increased 50 per cent but the horse time has decreased by two-thirds and the man time is one-third down.

This shift is bound to have some far reaching effects in the production of potatoes. The operators with modern equipment seem to get the best yields. There are many reasons why this might happen, not the least of which is their ability to get a thorough job done when it should be done. Even on spraying and dusting, tractor operation took from nearly 25 per cent to about 33 per cent less man time per acre than horses (Table II).

TABLE II

TIME REQUIRED, COST OF MATERIALS, AND YIELDS FOR SPRAYING AND DUSTING BY DIFFERENT METHODS

(Based on Records for Crop Years 1944–1947 for Province)

	By Horse		By Tractor	
	Dusting	Spraying	Dusting	Spraying
Number Farms in Group	41	90	37	10
Average Yields (per Acre)	263	260	359	294
Cost of Materials	$12.87	$7.33	$16.26	$6.68
Man Labour (Hours)	3.2	8.0	2.1	6.2
Horse Time (Hours)	4.9	14.6	....	....
Tractor Time (Hours)	....	....	2	4.3

I have been surprised to hear many potato growers estimate that they are now using their horses less than 300 hours per year — some even say less than 200 hours. I think that if they sat down and figured what it costs them to keep a horse for a year they would realize they cannot afford to keep one for so little work. Costs will vary but the Central Experimental Farm figures that it costs them nearly $150. to keep a horse for a year. About $90. of that is feed alone. On that basis a horse working only 200 hours a year would be costing about 75c. per hour. Compare that with a 2 to 3 plow tractor, costing just over $1. per hour when working 250 hours per year. It is equal in power to 2 teams or 4 horses. In other words, the horses might cost up to nearly three times as much for power delivered, to say nothing of the extra man power required to drive two teams instead of one tractor. Many would find it difficult to operate a farm completely without horses, but it would seem that it might be possible to double up on the use of teams or perhaps the long-time trend to larger farms will solve the problem.

It is certain that we have not seen the ultimate yet in work simplification or improved methods of production. It looks as though we are in the midst of a changeover to newer and better production methods. Our problem in the future will be to sift the good from the bad. In other words, we will need to seriously study the changes and to determine which will pay and which won't. The investment is so high that the information will be badly needed to ensure that only the most profitable practices should be continued.

We hope to have a few more facts to go on when the new study is completely analyzed.

DISCUSSION RE COSTS OF PRODUCING SEED POTATOES

by Morris Darby, Waverley, Ontario, President, N. Simcoe Seed Potato Growers' Co-op.

EACH YEAR the Ontario potato growers, along with other growers and farm organizations, request many types of service or assistance through the Department of Agriculture, and as an Ontario potato grower, I would like to thank the Department officials who have co-operated in making the Cost of Production Survey possible. I would like to commend the work of Dr. Patterson and his staff, the results of which have been given us in his report. Although I did not participate in the Survey this year, the information obtained is of importance to me and all other potato growers.

As a seed potato grower and representing one of the best seed districts in the Province, we welcome this opportunity to discuss with our customers and fellow growers, a few of the problems that confront us. One angle of this Cost of Production Survey that I am particularly interested in is that of cost of producing certified seed vs. table stock potatoes.

It seems to me that if every commodity organization were able to produce a true picture of the actual cost of their product, there would not be the ill-feeling between consumer and producer that sometimes develops.

I wish to mention a few factors essential to the growing of certified seed:—

1. Soil conditions must be right to obtain smooth, typey, clean potatoes.
2. Seed of the highest standard must be used and this grade demands a considerable premium over seed used for ordinary table stock planting. If you unfortunately run short of seed for a certified field you just can't plant any ordinary potatoes beside them, and as a result sometimes a half acre or so in a prepared field is lost.
3. Isolation is important and often upsets your crop rotation.
4. Cultivation, roguing, adequate spraying or dusting are essential, as all certified fields must pass rigid field inspections according to rules and regulations set forth by the Dominion Seed Potato Certification Branch. One advantage seed potato growers do have is that the inspection service is free of charge.
5. Every precaution must be taken while harvesting and storing to avoid loss from bruising and mechanical injury.
6. When it comes to grading, this is probably where we suffer our greatest loss. As a rule, only fifty to sixty per cent of our crop will grade as No. 1 seed, and it requires much more time to grade seed than it does to grade table stock. Many prospective users of Certified seed do not become seed conscious until spring or near planting time and as a result a great deal of top-quality seed is sold to the table stock market, due mostly to the lack of adequate storage facilities. It should also be kept in mind that the average seed grower follows mixed farming and would like to have the bulk of his crop moved before the spring work opens up.
7. Another regulation that a certified grower must live up to is that all seed sold must be in new bags. The inspector must also be satisfied that all bags, machinery and storages have been properly disinfected. As many diseases and particularly Bacterial Ring Rot are transmitted by

machinery, the co-operative use of potato equipment is practically condemned by our Inspection Service, the result being that every grower must of necessity possess a full line of equipment or satisfy the inspector that all machinery and equipment has been thoroughly disinfected.

8. In order that he may give his crop the necessary attention, the certified grower will only have a small acreage as compared with table stock growers, and so his investment in machinery and equipment is much greater per acre of crop grown.

Reliable tests at the Dominion Experimental Farms, at the O.A.C., and through our County Crop Improvement Association, have proven beyond all argument that with no crop is good seed more important than with the potato crop. Many commercial potato growers have found that it pays to use Certified seed or better, and use substantial quantities each year. Other growers seem to have the impression that they should get good seed at table stock price or less.

In this short discussion, I have pointed out some of the difficulties of seed potato production, which in themselves will suggest that seed potatoes must bring a substantial premium over table stock prices if the seed growers are to do a good job and stay in business.

In conclusion, seed growers, in my opinion, would appreciate it very much if Dr. Patterson would follow up the Cost Studies on Potatoes still further, paying more attention to the Cost Factors in producing seed.

From present prospects it would appear that farmers in general and potato growers in particular might have a rather difficult period of adjustment ahead for the next few years. We will, therefore, need all the help we can get in reducing costs of production while at the same time maintaining the quality of our product at the highest possible level. I am sure the work that Dr. Patterson is doing will be most helpful in this respect.

A group of growers from Durham County visited North Simcoe area in July, 1949.

PROGRESS REPORT — POTATO SCAB COMMITTEE

by Dr. G. H. Berkeley, Officer in Charge, Dominion Laboratory of Plant Pathology, St. Catharines; and Chairman, Scab Research Project Committee

This report covers the second year of the potato committee's work. In 1949 a limited survey was carried out, and special field plots were established at Ancester and Western University. In addition certain phases of the scab problem were investigated by the co-operating units. These units are Botany, Chemistry, Soils, Bacteriology and Field Husbandry Departments at O.A.C., Botany Department at Western University, the Pathological and Bacteriological Divisions at the St. Catharines laboratory of Plant Pathology and the Horticultural Division, Central Experimental Farm, Ottawa.

Already we are encountering certain inconsistencies one year with another. For instance in 1948 the survey indicated that scab was less severe where organic matter was high at the beginning of the season. This correlation did not hold in 1949. Again in 1948 there was some evidence that decomposing soybeans inhibited the growth of the scab organism. This inhibition was not apparent in the 1949 tests. Obviously these points require further investigation.

The Field Plots

At Ancaster we have rented 2½ acres of land for a 5 year period in order to test the value of soybeans and other horticultural practices in reducing scab. This land has produced severe scab for several years, so should be ideal for our purposes. Also at Western University a series of field plots have been established. At Ancaster we have 119 plots and at Western University 30 plots. The main object of these plots is to test the value of soybeans in reducing scab. Research at Western and the St. Catharines Laboratory under greenhouse conditions over the past 3-4 years has indicated that two or more cover crops of soybeans has reduced scab up to 75 per cent in severely scabbed soil. Even in wet soils at high temperatures, the most favourable conditions for scab development, soybeans have caused a pronounced reduction in scab. Therefore, the use of soybeans as a cover crop is promising for reducing scab. Hence, the reason why we have set up these field plots.

Some plots will receive soybeans as a green cover crop for 1,2 and 3 years respectively and then will be planted to potatoes. Obviously it will be 3 to 4 years before we have an answer to the effects of soybeans under field conditions. In other plots, soybeans will be harvested, and in others soybean hay will be added and incorporated with the soil. The object being to ascertain the most satisfactory manner in which to use soybeans in reducing scab.

Then certain crop rotations are being tested in other plots.

The effect of sulphur in increasing acidity and of lime in increasing alkalinity of the soil and the resulting effects on scab incidence is also being tested. In 1949, 1000 pounds of sulphur per acre lowered pH significantly, with a corresponding reduction in scab. But experience has shown that sometimes sulphur works and sometimes it doesn't. We will attempt to find out why this is the case.

Then in other plots, the organic matter will be built up by addition of manure etc. to ascertain the effect of humus on scab incidence.

In other plots, potatoes are being planted at different planting dates, to ascertain if planting date has any effect on scab incidence.

In still other plots soybeans are grown together with potatoes in the same hill to ascertain the effect, if any, of the growing soybean on scab reduction.

Other plots will be used to study the time and manner of infection by the scab organism.

Other plots have been set aside for the testing of resistant varieties and seedlings.

The Soils Department, O.A.C. is analyzing the soil, in each plot at stated intervals throughout the duration of these experiments. They are following the effects of the various treatments on pH, humus and common soil nutrients. This is a big job.

This summary of the field plots is sufficient to give an idea of the extent of the project and the amount of work involved. This is a long time project and no worthwhile results can be expected under 3 to 4 years time, due to the nature of the plots.

At this point, a few observations on results obtained from the plots in 1949 may be of interest.

1. The lowest scab readings were from soils having a pH of 5.5 or lower. The highest scab readings were in the medium acidity range (pH 6-7.0). When the soil reaction was alkaline scab readings were low, but not as low as in the high acidity range. In this respect the results of 1949 are in close agreement with those of 1948.
2. Sulphur at 1000 pounds per acre was the most efficacious treatment in lowering soil pH. Also scab incidence was low in the sulphur plots. Soybeans lowered soil pH in some plots and raised it in others making the effect of this crop obscure.
3. Lime at 1000 pounds per acre raised the soil pH appreciably.
4. In general, there was a tendency in all plots, except of course those treated with sulphur, for the soil reaction to increase slightly during the growing season.
5. In 1949, higher scab readings correlated with increased organic matter in the soil, while in 1948 low organic matter correlated with high scab incidence. This would indicate a need for continued observations over a number of years before we can expect an answer to the role of organic matter against scab.

RESEARCH

(1) Techniques for Identification Purposes

At the present time, the only technique we have to ascertain whether or not a strain of *Actinomyces* is parasitic, is to inoculate soil with the culture, plant potatoes and wait till they grow and produce tubers. This is a time consuming method which is further limited by the necessary rest period before tubers sprout. We have therefore, attempted to find a short cut technique but so far without complete success. It is known that some cultures of *Antic-omyces* produce brown to black rings in milk cultures and it has been reported in the literature that this formation of brown to black rings was a characteristic of parasitic strains only. If this turned out to be the case then we would have a rapid method for the identification of parasitic strains. But research work

at the Bacteriological Department, O.A.C., the Botany Department, Western University and the St. Catharines Laboratory of Plant Pathology has shown that it is not as simple as this. It is true that some strains form black rings while others do not, but soil inoculations at St. Catharines have shown that strong parasitism is not confined to the brown ring producing forms. In fact the highest scab readings have been obtained with strains that did not produce brown rings. Further work along this line is underway. It may be that brown ring producing forms are in the main parasitic, but it is nevertheless true that some non-brown-ring producing forms are also strong parasites.

Dr. Garrard and his staff are also investigating the possibility of differentiating between parasitic and saprophytic forms by certain other techniques such as the serological method and other physiological and bacteriological techniques. It is hoped that as a result of these co-operative efforts we shall ultimately find a short cut technique for identification purposes.

Infection

Another fundamental requirement for a successful study of the scab problem is more precise information as to time and manner of infection of tubers. In this regard the literature presents a very confusing picture and therefore, research on this phase was essential. From infection experiments at the St. Catharines Laboratory and in the plots at Ancaster we have ascertained that infection may take place anytime during the season as long as the tubers are growing. It is not necessarily confined to the stage when the tubers are first formed as has been maintained by some investigators. This was ascertained by different planting dates, and by transplanting plants grown in sterilized soil at St. Catharines to the field soil at Ancaster. New tubers formed after transplanting became badly scabbed as did the eye-end of tubers that enlarged after being transplanted.

Further, in connection with parasitism, the Botany Department, O.A.C., is investigating the cellular structure of resistant and susceptible varieties to ascertain the nature of resistance, the mode and loci of infection and the tissue involved. This anatomical study is an essential to a clear understanding of parasitism. Some very interesting findings have already been obtained. For instance, it has been generally accepted that resistant varieties have more cork than susceptible varieties and that this cork acts as a barrier to infection. That this is not the whole story, is at least indicated by the uneven pattern of cork development. Here again the work is in a very preliminary stage and as the work proceeds we may have to change our opinion in this connection.

Strains

It is known that scab lesions are of at least two types namely, a mild russetting of the surface and a more deep seated definite lesion. Are these two types caused by distinct strains of *Streptomyces* or by a single strain under different soil and environmental conditions? These two types are called type 1 and type 2 lesions.

In preliminary work at St. Catharines it has been found that cultures isolated from type 1 lesions have produced type 1 russetting upon inoculation. Likewise cultures from type 2 lesions have produced type 2 scab. This would suggest that different strains of *Streptomyces* may be responsible for the variation in type of lesions. If this be true, then in certain districts of Ontario

one type predominates, while in another district, another strain or strains may predominate because the survey has indicated that type 1 lesions predominate in one field or one district while in others, type 2 lesions predominate. These investigations have not as yet progressed to the stage where we can accept this interpretation as being the correct one. Verification is required and further investigations are underway.

Environment

One point on which the literature is in agreement is that scab is more severe under dry soil conditions. We have verified this to be the case. In soil temperature tanks at St. Catharines the scab incidence in dry soil was around 42 per cent but in the same soil kept wet the scab incidence was only 12 per cent.

In a similar tank experiment under wet and dry soil conditions but where soybeans had been previously incorporated in the same scabby soil, the soybean cover crop reduced scab in the dry soil from 42 per cent to 13 per cent in the wet soil from 12 per cent to 4 per cent.

Apparently, therefore, the beneficial effects of soybeans hold even under soil conditions most favourable for scab development, namely in dry soils.

These same tank experiments indicated that a soil temperature around 70-75° F. was most favourable to scab development in both dry and wet soils.

Antagonism

The possibility of ultimately using the phenomenon of antagonism in relation to scab control is being investigated, though how practical such a method may be, remains to be ascertained. It is a well known fact that one organism may inhibit the growth of another i.e., one is antagonistic to the other. Are there any soil bacteria, fungi or Actinomyces that exhibit this antagonistic phenomenon against *Streptomyces scabies*? If so, such cultures might be built up in the soil and thus exert a natural reduction in scab. It can be reported at this time that from 40 organisms tested to date, six have been found to be strongly antagonistic to *Streptomyces* scabies, the scab organism. I may also say that we still have 100 additional soil cultures to test against *S. scabies* for possible antagonistic effects.

Resistant Varieties

One of the most interesting and most promising means of controlling scab is by the use of suitable resistant varieties. To this end named varieties and numerous seedlings originated at Fredericton and elsewhere are being tested in various sections of Ontario. This phase of the scab project is under the joint supervision of the Horticultural Division, C.E.F., and the Field Husbandry Department, O.A.C.

Of the named varieties tested Menominee, Ontario and Seneca have all shown a high degree of resistance against scab. At Ancaster last year, the Ontario variety gave good yields of scab free potatoes. In so far as resistance is concerned these varieties seem to be most satisfactory but as to whether or not their horticultural and culinary characteristics will be satisfactory for commercial production in Ontario remains to be ascertained. As to seedlings, some thirty were tested this year at Ancaster and at five other locations in

Ontario. Several of these seedlings have shown a very high degree of resistance and are most promising. It appears that within a few years, we should have some really good resistant varieties.

The Ontario and Seneca are worthy of trial by growers, especially in fields where scab has been a severe factor.

Another interesting point in connection with these resistant varieties and seedlings is that any scab that has developed is of the type 1 or skin russet type, most of which could be included in Grade I potatoes.

Soil Disinfectants

Another possibility in relation to scab control that is under investigation is the use of soil disinfectants.

A start was made this year on this possibility by the Field Husbandry Department at the College potato farm. Five chemicals, Arasan, Spergon, Fermate, Zerlate and Phygon were incorporated in the soil around potato plants both as powders and as liquids. All five chemicals appeared to give a favourable effect but it was apparent that the placement of the chemicals was most important. Special attention will be paid to placement in future tests. These preliminary tests were sufficiently interesting to warrant further tests with these and other chemicals.

From this report, you will note that the scab committee is investigating this most complex problem in a cooperative manner and from nine different angles or approaches, so that we are not placing "all our eggs in one basket." Such an approach should be most fruitful in results but the solution of the problem is still beyond our grasp.

I note that the title of this report is given on the program as "Solving your scab problems." This is our goal but it has not been reached as yet. However, in the meantime, the use of resistant varieties is to be recommended especially in those soils where scab has been a severe factor. The Ontario and Seneca varieties are worthy of trial. Secondly, the use of two or more green cover crops of soybeans in the rotation previous to potatoes is also worthy of trial and should reduce the incidence of scab.

The committee trust that in 3 to 4 years' time, a report under this year's title of "Solving your scab problems" may be in order. I can assure you that we shall do our very best to accomplish this goal.

Comparing an eight-ounce potato with eight ounces of the following it is found that macaroni is four times more fattening; rice 3½ times; oatmeal 4 times; chocolate cake 4 times; a piece of pie 3 times; a doughnut 2 times.

—Prof. Elizabeth Whittaker

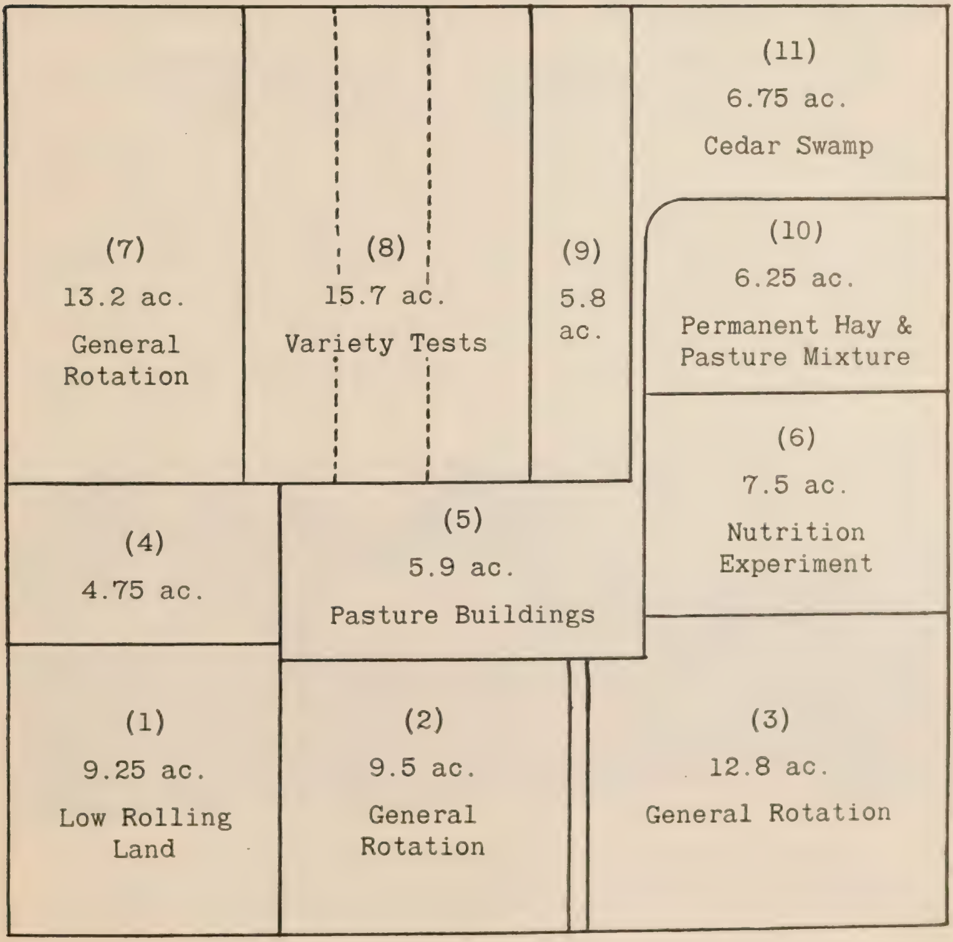
THE ONTARIO AGRICULTURAL COLLEGE POTATO FARM

by Dr. G. P. McRostie, Department of Field Husbandry, Ontario Agricultural College, Guelph, Ont.

A DEFINITE scheme of co-operative potato investigations and demonstrations was initiated in 1936. The parties concerned were the Dominion Experimental Farms Service, the Ontario Agricultural College, County Crop Improvement Associations, Agricultural Representatives, and selected potato growers. From the years 1937 to 1942 inclusive, demonstrations were conducted on 101 different farms in Central Ontario. In addition, detailed experimental work was undertaken on a few farms in Middlesex and South Simcoe Counties.

In 1941 the investigational work was centered on the farm of Mr. Thompson Banting near Alliston. A lease was secured on some twenty acres. Five acres of this was used each year.

Throughout all of these years it was felt that the consolidation of the investigational work on a permanently-owned farm would be a distinct ad-



vantage. The accumulative effect of any cultural practice could be studied and certain areas might be definitely set aside for special investigations. Resolutions supporting this idea were passed and forwarded to the proper authorities by various organized groups interested in potato growing.

The net result was that in the spring of 1946 the County of Waterloo, with assistance from the Provincial Department of Agriculture, purchased a farm near Hespeler, Ontario. This has been leased to the Ontario Agricultural College for a period of twenty years with the option of either outright purchase by the Department at any time, or renewal at the end of the twenty-year period. This property is now known as the "Ontario Agricultural College Potato Farm" and is the responsibility of the Department of Field Husbandry.

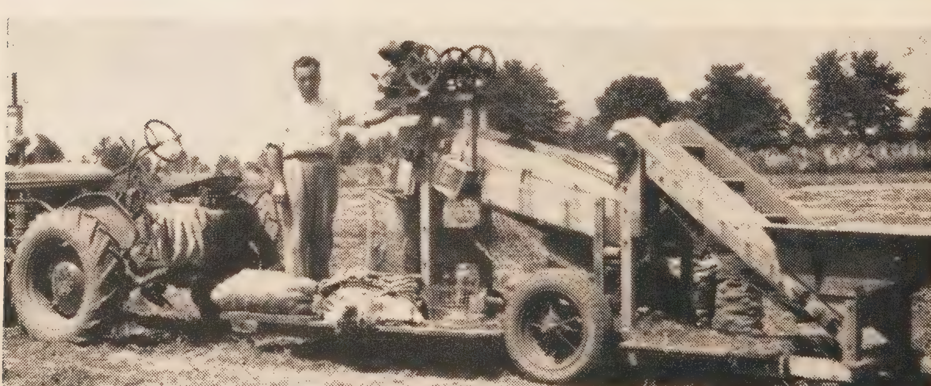
The soil is classified as a Fox sandy loam with variations. In topography the area is slightly rolling, with reasonably good under-drainage, apart from several low areas. At the time the property was acquired it would be considered to be a low fertility farm.

The farm consists of approximately 100 acres, of which around 70 acres is potentially good potato soil. Of the remaining 30 acres around 12 acres is being reclaimed by drainage. The remaining portion is being used for hay and pasture and a small area for reforestation.

The accompanying map indicates the manner in which the farm has been apportioned for the various phases of work being undertaken.

The following is a list of the projects which were under way on the farm in 1949:

1. Variety Test: with 49 varieties and seedlings.
2. Adaptation Test: of local and introduced seedlings. There were 780 seedlings under test.
3. Nutrition studies involving the study of the effect of varying the quantity and quality of plant foods supplied to the growing crop.
4. Rotation block where 1-, 2-, 3-, and 4-year rotations are being studied.



POTATOES ARE RAPIDLY GRADED IN THE FIELD, WITH THIS HOMEMADE MACHINE.
Pictured above is Orley Marshal, Waterdown, Ontario, with his homemade potato grading machine that is conveniently pulled to new locations to grade the 95-acre crop grown this year. The grader is powered by an auxiliary gas engine mounted on top.

5. Establishment of a scab nursery for testing varieties and seedlings.
6. Weed control studies by the use of 2,4-D on Cobbler, Canus and Katahdin varieties. Three dates of spraying were used.
7. A comparison of various fungicides and herbicides for the control of insects and diseases of the potato crop.
8. Interplanting potatoes with soybeans, corn, etc., for scab control.

Since the farm was secured, a good deal of improvement has been made, both in the material equipment for experimentation and in the buildings on the area. All buildings have been repaired, painted, and electrified. Running water has been installed in the house and barn and an ample supply of water insured by the drilling of a very satisfactory well. Sufficient water will be available for the initiation of some irrigation studies.

It is also planned to use a part of the stable portion of the bank barn as a storage as soon as the necessary alterations can be made.

We feel that this Ontario Agricultural College Potato Farm has now been developed sufficiently that it should be well worth visiting. A cordial invitation is extended to potato growers to call in to see what we are trying to do.

IMPRESSIONS OF THE GOODWILL POTATO TOUR

by Jack McPherson, C.B.C. Farm Broadcast Commentator, Ontario and Quebec Region

FIRST, I'd like to express my appreciation for the opportunity of bringing to you a few of my impressions of this first Goodwill Potato Tour, under the auspices of your Association. Indeed, I'd like to express appreciation for the opportunity of going on the tour. It was something I'll never forget and for many reasons. Some of them possibly should not be told from this platform.

Now what about this tour? Why was it a success? What made it worthwhile? To these questions let me first say there are more answers than I can give you in fifteen minutes. However, I believe you are going to hear from a grower after I'm finished, so you'll hear another side of it then.

To me, the first important thing about the tour is that your organization was sufficiently far-sighted to sponsor it, and secondly, that so many growers were sufficiently far-sighted to go on the tour. That's a good sign. We all have a tendency to become so engrossed with our own problems in our own little sphere, it does us good to see something of the other fellow's problems. Sometimes ours don't seem so big after we've seen his. At the same time, he may give us ideas of how to overcome our own problems. I do know one thing, and that is the Ontario growers who took the tour now have a much healthier respect for the potato growers of the Maritimes than they had before. I know a good many of them thought before the tour, the Maritime Potato grower was pampered and wasn't doing much of a job. After a few days, travelling in the area, however, this impression became a thing of the past. Here are some of the reasons for the change in attitude. They found the Prince Edward Island Growers must by law, plant potatoes which are at least certified. This is a big step. Then there is a levy on all potatoes leaving the Island and this levy goes into a fund used for the purpose of improving the industry. The Island Deputy Minister of Agriculture, Walter Shaw, said he felt this was a

step in the right direction with the growers financing their educational work rather than the Government. Another eye-opener, came with a visit to a bag factory at Summerside. It was pointed out that the 1949 potato crop would be the first one under which all potatoes leaving the Island would go out in bags with the same design printed on them. There's simply a space left at the bottom of the design where the individual growers name is placed on the bag. In other words, they are Prince Edward Island Potatoes First and John Smith's potatoes from P.E.I. second.

Grading Demonstration

In New Brunswick, too, there were demonstrations of a job of grading and merchandizing potatoes. True, most of what we saw in New Brunswick so far as marketing is concerned was the work being done at the Big Pirie layout at Grand Falls and the Hatfield Plant. Senator Pirie of course, is the biggest potato farmer in the Dominion and his plant was really something.

However, it was notable as we travelled through the rich potato lands of the Saint John Valley, that the farmers all paid attention to handling their crops well. They nearly all had the potato storage houses which typify the area and visits to these houses soon convinced us they had the ways and means of handling their crop and marketing it efficiently.

As we travelled about, I liked to try and get the impressions of our Ontario growers, and I got a good many of them, too. However, the one which sticks with me strongest, was a remark made to me on the way home. One of our leading Ontario growers was sitting with me and I noticed he was rather quiet.

The group arrives at Quebec City.

I assumed he was thinking about the trip and asked what was on his mind. He hesitated a minute and then said . . . "You know, Jack, this trip has convinced me of one thing more than anything else. We can grow just as good potatoes as they can and I think we can do it as cheaply. However, the fact remains that unless we follow their lead and do a real job of marketing our spuds, we might just as well quit growing them and leave the potato business to the boys in the Maritimes." I had somewhat the same impression but it certainly was interesting to hear it from one of our successful growers, a man who, incidentally, does a good individual marketing job. However, he pointed out this wasn't enough. He figured it needed at least the growers of a County and better a larger area to work together to do a co-ordinated job. Well, of course, we have some good starts already made in this direction in a couple of our counties.

So far as growing potatoes and the farming was concerned, I got the impression our Ontario group really felt most at home on the Island. The farming was more generally mixed farming with a four year rotation. The land seemed to be in fine shape and they certainly had wonderful crops of feed and fodder as well as potatoes. However, the specialized potato farming of the Saint John Valley left an impression too. On many of the farms they run a two-year rotation with Crimson Clover, an annual legume, being grown in the off year to keep the necessary humus in the soil. Also they fertilize heavily. One farmer, showing us a field of Katahdins, said he had put on a ton of fertilizer per acre in the spring on his clover sod. Well, he was getting results for he estimated his crop at 150 to 160 barrels per acre. . . .equivalent to about 450 bushels. Speaking of barrels, it was an odd sight to see a field already to be dug where they had hundreds of barrels scattered over the field. Their land is stoney so while they use diggers, mechanical pickers are useless and they are all picked by hand. They have various ingenious devices for lifting the barrels onto trucks and wagons. By and large, these farms were well mechanized, though many favoured the sprayer as against the duster. One of the main reasons given for this was labour. One fellow put it this way: "I can't get men to get up at three A.M. to dust and I'm. . . .if I will at 63. Besides the sprayer does a good job and is a bit easier on materials."

Concentrated Growing

However, it wasn't till after we'd crossed the border from New Brunswick into the famous Aroostook County of Maine we saw really concentrated potato growing. This one large county produces annually more potatoes than the Dominion of Canada. We spent one afternoon looking around it and just as we were leaving, one of the fellows who was travelling in the same car turned and said, "Jack, we've driven all afternoon and we haven't seen a spotty or dirty field of potatoes. I wouldn't believe it if I hadn't seen it." And he was right.

Potatoes are the reigning monarchs of Aroostook County and they are given every chance to flourish. The Maine Potato Experiment Station works very closely with the growers and between them they have built up a terrific industry. Again the need for organic matter forces them into a two-year rotation, using some cover crop for organic matter in the off year. Crimson clover is popular here too, with Mammoth clover and rye grass also finding some favour. Recently, millet has been tried and the authorities at the experimental station seemed to feel it gave more organic matter than any other crop.

Fertilization is heavy. . . . up to a ton per acre. . . . and as a result the soil has become acid, necessitating the application of lime. In some cases, they put on as much as 1500 pounds per acre. This all means they have to get a good crop and market it well. They have a strong growers marketing co-operative and have carried out a real campaign of selling their potatoes for seed throughout the whole United States. They have even had a coloured movie produced for this purpose and this was shown to our group. It made a deep impression and I suspect it gave some of our fellows some ideas too.

However, there was much more to this tour than just seeing how the other fellow grew potatoes. It was called a "Good Will Potato Tour" and it was just that. What's more, I think it accomplished its purpose. Certainly it would be hard to imagine greater courtesy or a warmer hospitality than we experienced throughout the trip. This came first at Quebec City, where we were guests of the Quebec Government for a conducted bus tour of the city. Then on to New Brunswick where we were greeted at seven in the morning by the Deputy Minister of Agriculture and several of his staff. We were their guests so far as transportation was concerned for three full days. They had chartered two buses to transport us, with the overflow travelling in some cars of the officials. During the first day we spent the afternoon in Aroostook County of Maine and again the warmest of welcomes from these American growers. We were taken everywhere and shown everything you could ask for. Then when we went to the Island, the whole group were met at the Cape where we boarded the ferry by Graham Rodgers of the Island Civil Service, who briefed us on what to expect. When we got to the Island there were twenty-five cars waiting at the ferry dock to take us around. Most of the drivers were potato growers from all over the Island. True, they were proud to think a group of growers from another province wanted to see their Island, but they were also happy to show us all they could as well as extend to us their hospitality at mealtime. I must admit, there were some of our party who, at times, thought our hosts were too generous with lobster. In fact, I think one of the great educational features of the trip was the introduction of many of our party to this distinctive Maritime dish. When it was placed on the table it brought delight to the eyes of some and consternation to the eyes of others. Nevertheless, it was an indication that they wanted to place before us what was considered their best down there. Then there was the plane chartered by the Island Government to fly 26 of us back to the Mainland. A flight and a sight never to be forgotten.

From remarks I've heard, and reports from down there, I understand the tour spread much goodwill in that part of the world for our Ontario. On the other hand, I do not believe you will find a man who took the tour who hasn't a good word for the Maritimes — even though he does have to compete with their potatoes. There was another good will feature which shouldn't be overlooked. The 65 on the tour included mostly potato growers. However, sprinkled through the group were a couple of Agricultural Representatives, a buyer or two, manufacturers of potato machinery, the Supervising Inspector of the Dominion Seed Potato Certification Service, the Secretary of the Senior Judges of the Supreme Court and her friend, the Agricultural Agent of the C.N.R. and of course your own Dick Goodin. Then as if they didn't make enough of a mixture they even let press and radio in. . . . though Don Macdonald and I were more or less segregated. . . .possibly with good reason. Seriously, though, what I'm getting at is here were 65 people from some 15 counties of

Ontario with different backgrounds and different interests. Yet we were thrown together for this eight day trip. We had a wonderful time together, we all learned a great deal and we built a lot of good will among the members of the tour . . . . really an understanding of the other fellow which was lacking before in most cases. That has been spread around the counties from which these people came. It was, I think spread in the Provinces and State touched in the tour. I like to think so, for it is the kind of understanding and good will which can give us hope for the future in the broader field of the whole world. However, we have first to learn to build it at home before we can expect to go further afield. Thus, even more than the potato lessons learned on the tour, I feel the "good will" feature alone made it more than worth while.

A typical scene in Eastern potato fields, when 65 members of the Goodwill Tour from Ontario visited the Maritimes and Maine. Here, S. G. Peppin (white shirt) of the Potato Certification Service, Charlottetown, P.E.I., explains some of the Island's potato problems to (left to right) Charlie Proudfoot, St. Bernadin; John Loughlin, Mountain; George Price and David Shillinglaw of Mount Albert.

A SERIOUS SITUATION!

Potato consumption in U.S.A. for 1948 was 108 lbs. per capita. This is 15 per cent less than the 1937-41 average, yet an economist finds that potatoes are still the cheapest food in household economy, for a housewife can buy 41 lbs. of potatoes for the average hourly income of city labor. In 1909-14 regarded as a basic period, an hour's labour would purchase only 18.2 lbs. of potatoes.

HANMER CO-OPERATIVE POTATO STORAGE AND WAREHOUSE

***by* Eugene Bourgeault—President**

As in all other potato producing areas of the Province, we in Hanmer have been faced with many problems. Our main problem, however, was lack of proper and sufficient storage space to provide for orderly marketing of our potatoes. A large number of our growers lacked sufficient space on their farms, with the result that potatoes have been dumped on the market in the fall, with a consequent decline in prices.

After considerable study a co-operative was formed and 100 members were signed up, each member purchasing a loan unit for $100.00.

With $10,000. as a starter we decided to build a central storage and warehouse at Hanmer. Approximtely 2 acres of land were purchased from the C.N.R. and an architect was engaged to prepare the plans.

The building is 45 x 141 feet and is built of reinforced concrete, cinder blocks and steel. The basement is 9 feet high with 6 feet underground and has a storage capacity of 20,000 bags.

The first floor has offices, a heated grading room 45 x 60 feet and a warehouse 45 x 60 feet for the handling of feeds, fertilizers and farm products. If and when required, we plan to install a grinder in the warehouse and prepare feeds for our members.

The second floor has a Community Hall, 45 x 71 feet, dressing rooms, a lunch counter, a stage, check room, kitchen, lockers, and elevator space for 12 cars of grain, and approximately 1000 square feet of floor space for storing bags, boxes, etc.

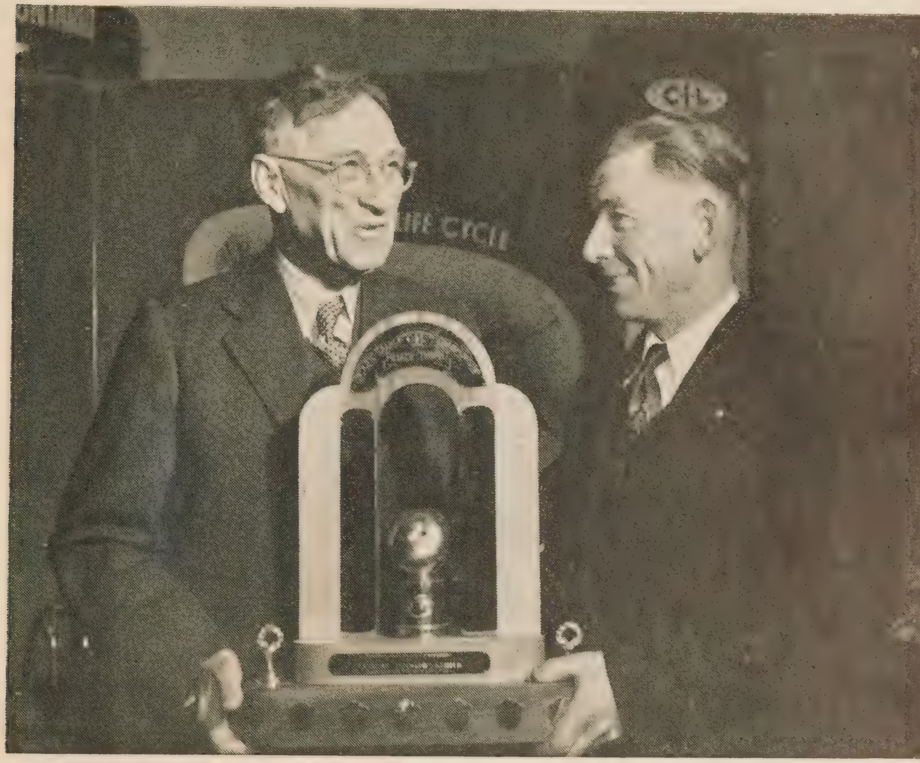
Brick pilasters were built every 14 feet in the walls of the building to support the ends of the beams. This was found to be more economical, and as red brick was used it gives the building a more impressive appearance. We plan to use white stucco on the cinder blocks between the brick pilasters. I might mention that steel beams 45 feet long were used in the ceiling over the hall with the result that we have no posts in this part of the building.

Construction on this project was started on June 13, 1949, and at present we are insulating the grading room and should be in a position to handle potatoes on the 1st of March. We will not be storing potatoes this year as the basement is not complete, but will be ready for full operation for the 1950 crop.

To date we have used 40 tons of steel, 12,000 cinder blocks, 22,000 bricks, 2,000 bags of cement and 80,000 feet of lumber in the building. In addition there are the doors, windows, stairs and insulation. We still have to lay hard wood floors. Our equipment consists of a Bean Rubber Spool Grader and plans are being drawn up for conveyors and ventilation system. Our cost to date is $35,000.00, and we expect to complete the building for a total expenditure of $50,000.00. This will include all equipment and a forced air heating system.

We feel that our storage and warehouse will render a real service to the potato producers in our section. With proper machinery a better grade of potatoes will be marketed, a factor that should tend to stabilize and increase

prices. Then too, the use of new stamped bags will assure a uniform and more attractive pack for the trade. In order to assure our customers of a continuity of supply, we plan to purchase 10,000 bags outright next fall and to keep a reserve of 10,000 bags on hand, in order that we may be in a position to fill orders as they are received.



CHAMPION POTATO PRODUCER

Col. the Hon. Thomas L. Kennedy, Ontario Minister of Agriculture, is seen presenting the handsome C-I-L Trophy to Frank Rick, Trout Creek, in the Muskoka-Parry Sound District. The trophy is emblematic of the championship in production of potatoes in Ontario. Mr. Rick produced 836 bushels to the acre, thereby topping all other growers in the province for yield, quality, exhibit and cooking test. The trophy was presented at the Royal Winter Fair. With it goes a cash award of $250.

POTATOES NOT FATTENING

When compared with other common foods, as given in the following table (calories are given per ounce):

Raw potatoes	16.7	Apple Pie	77.0
Boiled potatoes	26.8	Butter	217.9
Peanuts	155.4	Lard	255.0
Peanut Butter	167.4	Shredded Wheat	103.8
Granulated Sugar	113.4	Spaghetti	101.2
Bacon	177.1		

Begin today to eat less of the high caloried foods and more potatoes and greens and if your silhouette still casts a shadow upon your personality by revealing unsightly bulges eat less of everything. — Good Health.

OUR CENTRAL STORAGES

Dufferin—Elwood Hill, Hornings Mills

I AM pleased to present the picture of the new potato storage and warehouse, built this past year by the Dufferin County Potato Growers Co-operative Association. Our growers have been attempting to market potatoes co-operatively for the past five years. We have come to realize the benefit of a central storage and warehouse in order to put up a quality pack, and to have some continuity of supply. In the late summer the Association purchased a lot in the village of Shelburne, on a railway siding, with hopes of having a building ready to receive potatoes from the field. Unfortunately, owing to the shortage of steel, we were unable to have it completed during digging time, but several thousand bags have since been brought in from farm stables.

There are two storeys in this building—the first an underground storage, 60 x 80 x 10 feet with a capacity of approximately 30,000 bushels; and the upper floor of the same size, with ample space for grading and packaging; also for temporary storage for both graded and ungraded potatoes. Leading into the basement is a concrete ramp 40 x 15 feet with gable roof covered with steel.

The building of this warehouse was let by contract. Members of the Association supplied approximately 500 hours of volunteer labour, valued at 60 cents per hour, which amount was subtracted from contract price. The concrete wall, 12 feet high was poured in one complete pour from 10 a.m. till 11 p.m. All underground parts of this wall, and the floor were waterproofed. The wall, which continues up another 10 feet, is built of concrete blocks. The roof is a twenty-year bonded flat roof. The walls of the upper floor, and the two ceilings are well insulated and covered with ten-test.

The plan used for ventilation is the one recommended to us by the Horticulture Department, O.A.C., with thermostat control. The potatoes are placed on racks 8 inches above the concrete floor, and 1 foot clear of the walls, so that, with this system, the air changes every six minutes.

We plan for next season, to use bushel boxes for picking into, and storing potatoes, and each farmer to own his own boxes. Reasons for using bushel boxes are:

1. One handling from field to grader cuts down on mechanical injury.
2. It is easier to store variable sized lots coming in.
3. Convenience in handling and moving potatoes from basement to upper floor for grading.

Equipment

We have a large Haines grader and brusher with picking table, and a sewing machine for sewing 10 and 15 pound bags.

There are two hydraulic jacks with 25 skids, which are used to move potatoes quickly with a minimum of labour. We have an order on electric chain hoist to elevate potatoes from the basement to upper floor.

Financing

This venture has been financed through loans. Each of our 77 members signed a security note for $200.00, and we were able to borrow up to that

amount covered by notes, from the bank with interest at 4½ per cent. In addition to this we received a loan from the province of $15,000, which was adequate to complete the buildng. The Junior Farmers also helped to buy equipment.

In order to pay off these loans, we have placed the following charges on potatoes: Storage 10c. per bag; building fund, 5 cents per bag. Anyone wishing to use the storage must become a member.

From now on in this new building with its modern equipment, the Dufferin County Potato Growers Co-operative Association hope to improve and increase the output of their own "Hyland Brand Potatoes."

SOME LUSTY SONGSTERS

This photo was snapped at a Parry Sound District banquet at the Bernard Hotel, put on by the 600 Bushel Potato Club at Sundridge on October 26. More than one hundred attended the gathering. Singing is being led by Earl A. Grosse, Toronto, manager of the United Co-operatives of Ontario, and Dalton Caswell, Sundridge. Immediately in front of them are George Rick and Bob Long, Trout Creek, potato-club team standing third in provincial contests at the O.A.C., Guelph. At extreme rear is Allister Johnston, member of the Ontario Legislature for Parry Sound, and extreme right A. B. Caldwell and Mrs. Caldwell, Sundridge. Mr. Caldwell was District Director of the Ontario Crop Improvement Association.

OUR CENTRAL STORAGE AT COCHRANE

***by* Egon Anderson, Cochrane, Ontario**

FOR THE benefit of those who were not here when Mr. Shock spoke of this a couple of years ago, I will give you an outline of the storage building at Cochrane. It was erected in 1945 with the help of the Ontario Government, has approximately 130 members and cost in the neighbourhood of $32,000 with equipment. It is a 104 x 48 feet frame, with two floors above ground and potato storage beneath.

I shall commence with the top floor. This is full size and has three grain bins, two of which hold approximately 1,500 bushels each, and one holding some 5,000 bushels — balance is used for storage. This grain is elevated up from the freight car on the siding.

First or main floor. North end — office and living apartments, which are heated. Middle compartment, 42 x 48 feet, semi-heated and insulated, used for storage, shipping room and potato grading. Third compartment is equipped with feed grinder and mixer used for feed storage, grinding local and western grains and manufacturing commercial feeds.

Now we come to the potato storage. This is divided into three parts — furnace room and coal bin, 20 x 48 feet, north end; seed division extreme south end, 30 x 48 feet; balance approximately 50 x 48 feet, table stock storage. A division composed of lumber and wire screen separates the seed from the table stock with two doors equipped with padlocks and the manager has orders to see that these are kept locked. The reason that the seed is at extreme end is that it is of a lower temperature due to the fact that the furnace is in opposite end of the building. The space is divided into three rows of bins — the two outside being about 8 feet deep and the middle about 16 feet, which can be divided again, making these about 8 feet also. Two passages extend the full length of the storage. An inclining shoot in each of the storages takes care of the incoming potatoes. This storage has a capacity of about 12,000 bags.

The potatoes have kept very good in the past. Occasionally we get a load of potatoes with blight or frost which you all know does not help the appearance. The manager has informed me that about 5,000 bags have passed through this year, but considerably more would have been in storage had not a ruling been made by the Directors in the fall that only inspected potatoes would be stored in any part of the building. Some growers were not aware of this till it was too late for inspection. No seed was stored last year, but there was a small quantity this year, but during the summer a thorough disinfection was given the storage with a power sprayer and now with all potatoes being inspected should make it safe from a ring rot standpoint.

If it were possible to have a restricted area, it would greatly solve our troubles. I am quite aware that this takes both time and money, but I think the results would more than justify the outlay since it has been proven that potatoes from the north have given higher yields with less disease over those produced further south. This, I believe is chiefly due to the vigorous growth. Then this storage could make its full benefit felt since some of our growers are unable to have access to their root houses or in other instances roads are not passable at the time they should be shipped, especially to the extreme southern portion of the province.

At this point, I must give credit and thanks to Colonel Kennedy and staff for having helped both the Northern and Southern growers by allowing subsidy on freight on car lots of seed potatoes proceeding from the North to the South.

In conclusion, I, on behalf of the Northern Growers, welcome any from the South to come North and see this part of your Province.

FERTILIZER TRENDS, USES AND PROBLEMS

by Earle M. Grose, United Co-operatives, Toronto

THE first fifty years of the twentieth century have shown many outstanding developments in the commercial fertilizer industry in the province as elsewhere. Evidence to this effect can be gleaned from a comparison of consumption figures. In the first decade of this century there was less than 1,000 tons of compound fertilizer used annually in this province, while in 1949 this tonnage figure had moved to over 300,000 tons.

Why this tremendous increase? Undoubtedly commercial fertilizers must have proven an essential aid in the development of our attempt for a permanent land conservation and improvement program. Mark you, commercial fertilizers are not a panacea for proper drainage, rotation of crops, cultivation and conservation of the soil in line with as near correct soil management as possible.

On the other hand, I believe it can be truly said that commercial plant foods have been of inestimable service to the community in supply more abundantly and economically, those raw elements which are capable of restoring and maintaining the productivity of the land; to make poor land good and good land better.

Fertilizers have proven indispensable whether it is to grow a heavy cover crop, to conserve the top soil and to improve it or to raise commercial crops of high cash value, in a system of cropping which will permanently keep the soil at optimum level of fertility. It matters not how rich the soil may have been in its virgin state, if it is cropped year after year, as has been the case with much of our land under present day commercial systems. It is necessary sooner or later to apply all of the major and some of the minor plant nutrients, otherwise crop yields cannot be maintained at a profitable level. In fact the concept "minor" element is no longer tenable, anyone of the plant nutrients can become of major importance if it is seriously deficient in the soil. While we are on the subject of minor or trace elements in the soil there is another angle worthy of our consideration. As well as an abundance of organic matter, our virgin soils apparently contained sufficient quantities of magnesium, copper, iron, boron, manganese and cobalt. It has often been said that the health of our pioneers was better than that of the present generation. Would it be possible that a deficiency of minor elements in our present soils is being transmitted to us through the food we consume. It is quite conceivable that the exhaustion of these minerals in the soil through the years may have adversely affected our present day diet. This conjecture is at least thought-provoking and has for the past few years, been under experimental observation.

Before passing on, we cannot lay too much stress on the necessity of building up the organic matter in our soil with the assistance of the proper fertilizers.

Permanent pastures and cover crops are pre-eminently important. Please note this quotation, "I respectfully submit that permanent pasture will have a great deal to say. As a stimulus to healthy appreciation of the importance of permanent pasture. . . .I may ask why it is that Britain with all her age and experience, has placed one-half of her arable land under this crop. If the one hundred thousand farmers of Ontario do not within ten years make up one million acres of permanent pasture, we shall not only suffer for lack of progress, but will have to change our belief in the cupidity of average humanity." This is not a quotation from last year's Soil and Crop Improvement's proceedings, as well it might have been, nor my own, but rather from the report of President James Mills in his report of the Ontario Agricultural College in 1885. Could not the same suggestion be made to-day?

It is not so long ago that agricultural workers based their theory of fertilizer use on the basis of soil needs exclusively; to-day the emphasis is increasingly being put on crop needs as determined by plant chemistry, plant tissue test and nutritional values. It would appear that ultimately the nutritional value of the crop to be grown will be the determining factor. Generally speaking, the emphasis on crop production has been a matter of dollars and profits. Our economic system has brought out this emphasis. However, we must not ignore nutritional value and it behooves us to commence emphasizing this phase along with gross yields. It is true we have produced wonderful yields of potatoes. Could it be possible we have done this at the expense of quality?

In our retrospection of the fertilizer industry, for the past several decades, many changes have taken place with regards to the use of materials in blending, mechanization of plants and changes in analyses. Let us review some of these items. Generally speaking, a complete or compound fertilizer comprises a mixture of diverse materials of varying particle sizes and densities. No matter how thoroughly one may mix them, segregation cannot be avoided. The superphosphate is more or less powdered, if ordinary run-of-pile; if some treble superphosphate is also used, this is more likely to be granular. The nitrogen carriers may be light bulky materials or most likely they will be in the form of solutions or granular. The granular nitrogen materials could be ammonium nitrate, granular cyanamid or ammonium phosphate. The potash salts most likely are powdered, although some granular potash is usually available. If potash is supplied in the form of manure salts, which have a strong tendency to absorb moisture, caking is bound to take place. Mix these various materials thoroughly and what happens? The lighter and finer

Durham County Potato Growers go on a Pilgrimage.

particles tend to segregate from the coarser ones. The industry could grind them all to a fine powder to secure uniformity, but the farmer wouldn't take it because of the difficulty in that it would not be freely drillable. Samples taken from mixtures of this kind from the pile or from individual bags will not be uniform, principally because of segregation.

When batches are dumped into the bin, conical piles form and the coarser particules roll down the sides to the bottom. The same happens in filling bags. Sample cores taken through the middle of the bag, can and do vary in analyses from cores taken from the sides. On the other hand, when the farmer dumps a bag of fertilizer into the fertilizer box of the drill and spreads it out he invariably has secured a uniform application of the analysis he is using. Such is one of the problems in the use of materials of higher analyses goods.

The trend is definitely toward a higher plant food content in compound fertilizers. According to K. D. Jacob of the U.S. Department of Agriculture, the averge plant nutrients of commercial mixed fertilizers has increased from 13.9 per cent in 1900 to 21.65 per cent in 1945, — roughly an increase of 56 per cent. In Ontario the increase is also very marked. I can remember a 1-8-1 brand being offered for sale and to-day we have a 4-24-12. This trend to higher analyses will, it seems to me, continue because of the savings that can be affected. Granular fertilizers have to quite an extent, overcome the drillability problem.

In conclusion, let us review the matter of prices on fertilizer over a term of years. This not only gives a comparison of prices, but also shows the trend of analyses.

Brand	1927 (per Ton)	1950 (per Ton)
0–10–4	$27.70	*
0–12–5	33.25	*
2–8–2	30.20	*
2–12–2	40.50	*
2–12–6	43.50	$36.80
2–16–4	46.00	*
2–16–6	*	41.80
3–12–0	35.40	*
3–18–9	*	50.50
4–24–12 (Granular)	*	69.00
5–10–5	43.50	*
5–10–13	*	49.00
16% Superphosphate	24.00	*
20% Superphosphate	*	33.00
Muriate of Potash 60%	57.50	60.00
Sulphate of Ammonia 20% N	67.50	60.00
Nitrate of Soda 16% N	70.00	82.00
Ammonium Phosphate 11–48	*	86.25
Ammonium Nitrate 33% N	*	79.00
Ground Animal Tankage 6–15	45.00	75.00

*Brands not offered for sale in years shown.

In view of the above comparison, it can be truly stated that taking into consideration, advanced labor costs, increases in freight, higher raw material prices and increased equipment costs, that the prices of compound fertilizers have been kept at a minimum. I make bold to say, that the increase which the farmer has been obliged to pay for his fertilizer needs, is the lowest of any of his commodity purchases.

Finally, let me draw your attention to Bulletin No. 463, "Soil Management and Fertilizer Use," issued by the Advisory Fertilizer Board of Ontario. I recommend this to your serious perusal and contemplation. It may be secured from Statistics and Publications Branch, Parliament Bldgs., Toronto, Ontario.

THE DESIRABILITY OF PROGRESSIVE POTATO GROWERS IN ONTARIO BECOMING MEMBERS OF THE POTATO ASSOCIATION OF AMERICA

W. L. S. Kemp, Canadian Representative on the Membership Committee, Potato Association of America, O.A.C. Guelph

As far back and even prior to World War I, food supply of the world, including that all important item potatoes, became of paramount importance. Increased study of the relationship of fertilizers, insecticides, rotations, etc. was undertaken. The production of certified seed was begun in Wisconsin in 1914 followed by New York State in 1915. In Ontario and the Maritime section of Canada similar improvement measures were inaugurated about the same time.

These foregoing steps to improve the potato industry brought about the need for a clearing house organization to co-ordinate grades, certification standards and investigational work. This necessitated the publication in which the results of current potato research could be made available at small cost to all interested parties. Thus, it was that 25 years ago, the Potato Association of America was formed and the publication of its journal commenced.

Briefly, the merits of the Association are two-fold. In the first place, it provides the progressive grower with the latest up-to-date information in regard to his problems by its monthly journal. In the second place, it allows him to take his special problems to the annual meeting of the association, frequently held near border points. He also has an opportunity to learn of the experiences of others and will be frequently forewarned against malpractices as well as being informed of desirable ones.

The opportunity of associations and the privileges of these meetings in permitting each and every member an opportunity to meet and discuss problems with recognized leaders in the industry including growers and officials is beyond monetary estimate. The receipt of the monthly copies of the journal alone will repay the annual fee of $2.00 in American funds, as contrasted with $2.50 to all other countries, tenfold.

Remit your fee and application for membership directly to John Campbell, Treasurer, New Jersey State Agricultural Experimental Station, New Brunswick, New Jersey, U.S.A.

Durham County Winners Don't Lose Interest.
Pictured above are the last four years' consecutive winners in the Durham County 500 Bushel Potato Club. They all made the recent bus tour of Ontario's potato growing industry. Left to right are: Alfred Johnston, Pontypool, winner in 1944 with 575 bushels per acre; Ernest Cavano, Pontypool, winner in 1945 with 495 bushels; R. H. Blakely, Pontypool, winner in 1946 with 679 bushels, and Delbert Olan, Millbrook, winner in 1947, with 652 bushels.

POTATO PRODUCTION AND MARKETING IN MAINE

by Clifford G. McIntire, Assistant General Manager of Maine Potato Growers, Inc.

As a potato grower in Aroostook County, Maine, and Assistant General Manager of a potato marketing co-operative, it is a pleasure to be in Canada and visiting with farmers who are also interested in potato production. I bring you the greetings of the officials of our State Department of Agriculture and the potato growers of Maine. I am sure of that, while we may be located in different production areas, that we have many mutual problems and I hope my visit will be mutually beneficial.

With your permission I would like to divide my time in the afternoon program into three parts. First, I would like to tell you about Maine potato industry in Maine in a general way. Secondly, I would like to tell you about Maine Potato Growers, Inc., a growers' co-operative, and thirdly, show you a film that was prepared by this co-operative in the interests of merchandising of Maine seed potatoes.

Century Old

About 100 years ago the first settlements were being established along the Aroostook River and other tributaries of the Saint John and upper Penobscot Rivers. These settlements were largely centered around the lumber industry but the people found this land fertile and its fame spread into southern Maine and the Maritime Provinces. With railroad transportation established in the period 1890 to 1910, the development of the area agriculturally took on real vigor and by 1925 about 400,000 acres were under cultivation in Aroostook County. Every acre had been cleared from the woods. The pioneering drive of hardly more than one generation built an agricultural empire out of the standing forest.

The demand for food in World War I gave the development of the potato industry in Aroostook a real push. About 6,000 separate farm operators planted a total of 126,000 acres of potatoes in Aroostook in 1925. This represented about 85 per cent of the total potato acreage in Maine and that same proportion has continued in subsequent years. Horses were the source of power and trucks on farms were virtually unknown. Planters, diggers, and sprayers were common but of limited capacity and a great deal of work done by hand. A farmer figured that one man and a good team could care for about 15 to 18 acres of potatoes except for the harvesting season. The principal varieties were Green Mountain and Irish Cobbler. The average yield per acre was about 80 barrels, or 200 to 225 bushels per acre. A grower sprayed with Bordeaux three or four times. He used about 15 to 18 bushels of seed per acre, and about one ton of a single strength fertilizer like a 4-6-10. By 1925 Maine seed potatoes were becoming well received and there were 18,311 acres entered for certification and 7,065 passed inspection.

Both seed and tablestock were shipped out in lined box cars, the tablestock was loaded in bulk and the seed in heavy 4B burlap bags with net weight of 165 pounds. In our seed work we were principally concerned with mosaic, rhizoctonia, scab and late blight.

Twenty-five years have gone by and we are up to 1950. We find the potato industry in Maine has made many changes. Consolidation of farms has decreased the number of farms in Aroostook from 6,000 to 4,200. We find about 33 acres of potatoes per farmer. The County is growing about 115,000 acres of grain, but the horse as the means of power on the farm has virtually disappeared. Tractors and trucks take his place on every farm. Two-row planters are common and two-row diggers are on nearly every farm. Winter storage has been developed rapidly and growers and dealers have provided good storage for 60,000,000 bushels with about one-half on the farm and one-half at track side. Many other changes have taken place. Each acre now has about 1,800 pounds of a double strength fertilizer like an 8-16-16 applied at time of planting. About 45 bushels of seed is used per acre, 8 to 10 applications of spray or dust is applied, all done with machines, and one man can care for 50 to 70 acres with additional help at planting and digging time.

In 1949, Maine produced 67,000,000 bushels on 141,000 acres, an average of 450 bushels per acre. Perhaps this yield per acre is higher than can be maintained as a normal yield. However, nearly 90 per cent of all acreage is planted with Certified seed. This fact, together with new varieties and better applied control, better disease control and better cultural practices has taken away some of the production risks of the early 20's.

In 1949 51,950 acres were entered for certification and 45,893 acres passed. The Katahdin is now the leading variety both in seed work and for tablestock. From the 1948 crop Maine shipped 9,000 cars of seed. Maine is proud of its program on Certified seed. A fine experimental farm at Presque Isle, plus a foundation farm at Masardis is the basis of seed sources for growers who produce foundation seed for the certified growers in the state. It takes acres of land in Florida to care for samples growers send from fields in Maine to provide accurate checks on seed to be used the next year.

Changes all round

While changes have taken place in production methods, so have there been changes in the marketing methods. The lined car of the old days has been replaced by the refrigerated car. These are pre-heated and rolled with supplemental heat. No longer are potatoes loaded in bulk. Seed moves largely in 100 pound burlap bags, while 90 per cent of tablestock moves in consumer packages, ranging in weight from 5, 10, 25 and 50 pounds. These are in open mesh and paper bags. Last season all tablestock was sized to 2¼″ to 4″. So far this season we have been loading 2″ to 4″, but will soon load only 2¼″ to 3¾″ stock. Certified seed maximum size is now 3¼″, which is about a ten-ounce potato.

The potato industry in Maine, as elsewhere, has had periods of prosperity and periods of depression. The 30's are memorable as rather tough times. In 1936 the growers of Maine taxed themselves one cent per barrel to provide a fund to be used to promote the potato industry.

The state legislature put through legislation, thus giving the program the support of law, and the State Tax Assessor's office was assigned the task of collection. The Maine Development Commission was charged with the responsibility of expending the funds, and a committee of five growers appointed by the Commissioner of Agriculture was set up to serve as an ad-

visory group. No state funds have gone into the program, as all expenses are paid from the fund collected. Since the program started in 1937 about $1,700,000 has been paid by growers with this program. The statute requires that at least 25 per cent must be used for research and nearly one-half million has been used by the Maine Agricultural Experimental Station for research work. Some has been used for administration and special projects and over one million in advertising. During the current shipping season three service men are working at the terminal markets in the interest of the Maine potato grower and shipper.

In periods of adversity, ideas and methods are often developed that will get little thought and attention at other times. In the early years of development in the Maine potato industry many groups assembled themselves into associations or co-operatives in an effort to improve their economic situation. This brought into being the Grange Stores and other co-operative efforts. Two or three attempts were made to establish growers marketing groups but none were successful.

The break in potato prices in 1930 started groups of growers in Aroostook to thinking again of the need of a real organization that constantly was working for the growers' interests. In 1932 about 70 growers grouped themselves to-

This picture was taken after a lobster dinner at Admiral Beatty Hotel, Saint John's, N.B. Top row (left to right) — E. G. Snyder, Preston; Thompson Banting, Alliston; Harry Laughlin, Caledon; W. H. Price and W. Shillingham of Mount Albert; Bob English, Alliston. Front — R. E. Goodin, Toronto; Henry Blakely, Pontypool; Bob Patterson, Kemptville; L. C. Roy, Toronto.

gether to form the co-operative Maine Potato Growers, Inc. to serve as a potato marketing organization. It was rough sledding. They started out with local groups with a central marketing organization. They also had fixed contracts binding growers to deliver all of the crop to the Association. Growers don't like to be bound by fixed contracts and were unhappy with that arrangement. One of the early changes was to drop off the local organizations and make the co-operative a simple centralized organization. Later, fixed contracts were dropped and all business done by members placed on a voluntary basis. The organization provided a sales service and also provided shippers' supplies. The present Manager came into the organization in 1937. His dynamic leadership has been a real factor in the sound growth of the organization since that date. About six years ago the Association purchased a bag factory at Caribou, Maine. The facility has been greatly improved and provides a real service to the industry. In the shipping season of the 1948 crop, this department provided nearly one-half of all the containers used in the Maine potato industry, which that year shipped 67,000 cars out of Maine. The current year will provide a greater demand for paper bags, which are printed at this factory. We estimate about 25,000,000 paper bags this season.

As time has progressed, the co-operative has developed its services until at present there is provided a marketing service for shippers, street purchasing of potatoes for smaller growers who do not wish to ship, shippers' supplies, farm machinery, farm supplies, market news service, and general services in the industry. In 1948-49 this organization of 2,000 members shipped 11,000 cars of potatoes and did a total volume of business of $21,000,000. It has earned for its members and patrons nearly a million dollars, and at the same time developed in the industry a strong organization, owned and controlled by growers, that is constantly working in all phases of the industry representing and protecting the growers interests.

A Board of Directors of 15 growers constantly guides the Association and the annual meetings attended last year by over 1,800 people give members and patrons a chance to learn in detail about the affairs of their organization.

I have told you a few of the highlights of our potato industry in Maine. There are numerous details that you would find of interest but time does not permit. Maine is not far from your good Province of Ontario and we extend you a most cordial invitation to come and visit with us.

WHAT AUTHORITIES SAY

No part of our food supply is more important than potatoes. They should be eaten every day by practically everyone.

— L. B. Pett, B.S.A., M.A., Ph.D., M.D., F.C.I.C.

The potato is not fattening and in view of its high nutrition value is easily the cheapest of vegetables.

— Professor V. H. Mottrum, London University

Potatoes supply reserves of strength as they are sustaining and easily digested. Potatoes are energizing and act as a preventive against disease.

— Great Britain's Marketing Board

MERCHANDISING POTATOES

by L. C. Roy, Agricultural Agent, Canadian National Railways, Toronto

IN ORDER to properly adjust our minds to the position of the potato industry in the Province of Ontario, let us first refer briefly to — (1) Our economic situation in Vanada and (2) A quick look at world trends in agriculture.

1. The Economic Situation in Canada

During the past ten years we have achieved remarkable progress, both agriculturally and industrially. Our gross national production in 1949 is reported to have been approximately 16 billion dollars, the highest on record. This compares with 5½ billion dollars in 1939. Our population increased 2¼ million in the same period. Canadian agriculture has improved steadily since 1939, or up to August, 1948, when a somewhat steady decline has since taken place. However, it is estimated that the value of our agricultural production in 1949 was only about 40 million dollars less than the peak in 1948.

We are today one of the six or seven most important food producing nations of the world. It is almost incredible that a nation of 13½ million people, with about ½ of 1 per cent of the total population of the world, should now be third among the world's trading nations. With such rapid growth in trade it is no wonder that we are now beginning to feel some 'growing pains'. In contrast to many other countries since the last war, Canada has not only refrained from over spending, but during the past three years, has reduced her national debt by 13 per cent. As John Fisher said at the Annual Meeting of the Ontario Federation of Agriculture last week, "We, as Canadians, do not fully appreciate the greatness of our country with its unsurpassed opportunities, nor are we taking the trouble to tell other people about it."

2. World Trends in Agriculture

According to the latest statistical information available, the agricultural production in 1949 resulted in the world's supply of food being slightly larger than that of any previous year. But in the Western world, we seem to have reached a peak in agricultural production, and we are today, with good reason, getting worried about our surplus crops and our export markets. Some authorities claim that world population is increasing faster than our production of foods, and that sooner or later, we will all face starvation. So it is no wonder that farmers, like the Ontario Oat King, John A. Stewart from Ailsa Craig, makes the statement that "Farmers should ask why there are food surpluses in Canada when they are told nearly half the world is hungry." Unfortunately, the trading world is now divided into three major compartments — the Cominform countries, the dollar, and the sterling areas. With drastic cuts in our exports of agricultural products, we are told that we face three solutions — (1) Increase our population to consume our surpluses — (2) Find additional export markets — or (3) Reduce our farm production, cut prices, or both. The consequences are serious in their contemplations. However, the time is probably opportune to start now to concentrate our efforts on more efficient methods of production, and on merchandising a higher quality product, presented in a more attractive form, and bring about a greater recognition of our northern grown Canadian food products.

3. Sources of Supply

Speaking in round figures, Canada has about a half million acres in potatoes, which produces approximately 50 million cwts. Ontario produces 22 per cent of the total Canadian production, Quebec, 24 per cent, the Maritimes, 40 per cent, and the remainder of Canada, 14 per cent. The highest average yields are obtained in the Mariitme Provinces, followed by Ontario, Quebec, and the Prairie Provinces. (The average yields vary from 153 cwts. in the Maritimes to 75 cwts. in Quebec, as far as the Eastern Provinces are concerned; and as low as 52 cwts. in the Prairie Provinces. The average yield for Ontario is 91 cwts., and for Canada, 100 cwts.) As a general comment, one could say that the only surplus producing provinces are the Maritimes; and for practical purposes, that all the other provinces produce for their local markets.

With this introduction I would like to discuss with you, for a few moments, the potato situation in this province. I realize that there is a great deal I do not know about the potato industry, and that most of you are better acquainted than I am with many of its problems. You will readily understand that it is not my intention to deal with these matters that are apparently well known to you, but rather to touch in a very general way, on certain aspects pertaining to the merchandising of your potatoes.

While you have made wonderful progress with the growing of potatoes during the past five or ten years, and I have no intention of belittling these efforts, I would like to quote to you, as a matter of interest, the opening paragraph from a bulletin published ten years ago:—

"Although the province of Ontario as a whole is not particularly suited for potato growing, the potato is found on more farms than any other single crop. On many farms the acreage is small, and does not warrant the expenditure in machinery and equipment necessary for the proper handling of the crop. In other instances the potato crop is considered as a side line by growers, and does not receive the attention necessary to obtain profitable yields."

The objective you then set for yourselves was "More bushels of high quality potatoes from fewer acres," and every year since then, you, as growers, with the help of the Provincial Government, through the organization of 500 Bushel Potato Clubs, under the Crop Improvement Association, have brought this industry to a financial position of importance, such as is exemplified by your numerous attendance at this meeting.

Ontario potato growers are particularly fortunate in having such important nearby industrial centres with a relatively high consuming population. The markets are at your doorstep, and these marketing advantages have probably led many to follow the line of least resistance, in that there are still too many poor potatoes being sold in Ontario. You know yourself that there has not been proper grading, nor the kind of packaging, to build up a satisfactory market. It is also realized that you lack warehouse facilities for a longer marketing period, and satisfied customers for maximum returns.

4. Now What Can We Do?

Mr. MacIntyre has given you an excellent picture on what they are doing in Maine. You have noted the importance they are attaching to controlled marketing and the selling of all their potatoes as a branded and quality product,

along with a well thought out advertising program to tell the consumers about their potatoes.

Every food today has a competitor in the spending of the consumers dollar. The advertising campaign of the Maine Potato Growers not only featured their branded product over other potatoes, but also had a tendency to halt the decreasing trend in the consumption of potatoes, and thereby maintaining a reasonable place for them in the average consumer's diet.

It is regrettable that so many of our Canadian producers do not think much of advertising and feel that it is so much wasted money. To these sceptics we can only say that all prepared foods are advertised, and that manufacturers know from experience that they must advertise to sell their produce in sufficient volumes for remunerative returns.

Let us look at British Columbia for a moment. (Probably it should be the destination of our next Goodwill Tour). As you know, the apple growers in that province have one of the best marketing agencies in Canada. The British Columbia Fruit Tree Growers sell their apples in every province of this country, and most of the time, at a premium, over local apples. They not only put up a well graded apple, packed in attractive packages, but by their advertising they have reached the consumers who today seem to show a preference for B.C. apples. It seems to be one of the outstanding growers' organizations in Canada about which we can brag.

Well, lately they have had a surplus of eggs and a drop in prices, like you have had; but instead of blaming everybody for their misfortune, they asked the Government for floor prices, and then decided to do something for themselves. The Poultry Industries Council, which they organized, is raising money to go after their local markets for an increased per capita consumption. Several thousand leaflets are to be put in egg cartons, in the retail stores, with good advertising material on them, playing up the food value of eggs and giving recipes for their use. Special posters are to be distributed to grocery stores, and a modest amount of newspaper advertising is being arranged, as well as special card displays for their street cars. They hope to increase their consumption to an egg a day per capita. Their attitude, in the long run, is that they have no other alternative. Either they will let their poultry industry shrink to prewar levels, or, as an alternative set-up, they will take it upon themselves to sell a highly nutritous food to the consuming public.

5. Let Us Look a Little Closer

It is not for me to say where the best potatoes can be grown in this province. At the same time it is significant to mention that the highest yield of potatoes in the history of this province was this year obtained at Trout Creek, about 25 miles south of North Bay, and that the Potato King is a resident of Hanmer, about ten miles north of Sudbury. The Cochrane area is now getting special attention for producing high quality seed potatoes, and it is of interest to note that the Penetang area shipped at a premium last year, forty-two cars of seed potatoes to nearby U.S. points.

Furthermore, if you will look at a map, you will find that quite a few of our higher quality Canadian and American potatoes are being grown north of the 45th parallel, which means, north of Bracebridge. This does not mean,

however, that potatoes cannot be grown practically anywhere, but let us not forget that quality potatoes seem to require a cooler climate and a lighter soil than is prevalent in most of Old Ontario.

Most of you here are not likely to discontinue growing potatoes. Due to the fact that you are so near your markets it may be difficult at present to organize all the potato growers of the province into one selling organization that will permit the proper carrying out of a merchandising policy such as they have been able to build up in the State of Maine. However, let us realize that all important movements have started in a small way, and there is no reason whatever that individual potato growers, no matter where they are, could not do something about growing better potatoes, putting them up in more attractive packages, building up a reputation for quality, and selling them under a branded trade mark.

I know of one peach grower, in the vicinity of Chatham, who has made such a success of marketing his peaches, that people from miles around go to his place to buy peaches, at a premum, and he never has enough to supply his customers. An interesting comment from one of the prospective purchasers, who had been refused because there were no more peaches available, was, that he would gladly have bought the culls if they had been for sale, as he thought most of them were of better quality than what he was in the habit of getting. The same thing can be carried on by any potato grower who wants to build up a local market for his potatoes at a premium price.

Some of you as individuals or as groups, have already done good work in putting up potatoes in attractive commercial packages. I would like to mention the son of W. M. Croskery, Agricultural Representative for Carleton County,

This group looked over P.E.I by plane.

who has put up about 11 acres in 15 pound bags, and sold them at a premium to the Loblaw stores; and it is the talk of the day around Ottawa and Eastern Ontario.

6. One More Comment

You have, in this province, one of the finest agricultural policies I know of in Canada, that enables primary producers to do something for themselves. Your Crop Improvement Association, with its 55 branches throughout the province, has already proven what it can do for you. It was only started 11 years ago through the efforts of John MacLeod, Wilf Lennox, and your former Deputy Minister, Dr. W. R. Reek, and which has been so successfully carried on since by Mr. A. H. Martin and his staff. Remarkable progress has been achieved with a number of crops. Your 500 Bushel Potato Clubs, organized under the direction of Dick Goodin, have been a contributing factor in making potato growing profitable. The time is probably come to go a step further in the study of a program to sell your potatoes to better advantage.

The purpose of this talk is to create an interest in further improving the potato industry. This could be followed up later if you are interested. It seems to me that this group of growers have it in them to do something about further improving the merchandising of their potatoes, which will be an added credit to their efforts after the success they have achieved as members of 500 Bushel Potato Clubs in the Province of Ontario. It is probably the right time, at the beginning of a downward price trend, to think, as individuals or collectively, about doing something for yourselves and not wait on what others may, or may not do.

Courtesy of Farmer's Advocate

THREE CROP IMPROVEMENT ENTHUSIASTS.

From the left: H. H. McNish, President of Ontario Crop Improvement Association; A. H. Martin, Director of Crop, Seeds and Weeds Branch, Ontario Department of Agriculture; D. L. Parks, in charge of Agronomy at Kemptville Agricultural School.

LIST OF INSPECTORS FOR TABLE STOCK POTATOES AND TURNIPS

The following are **inspectors under The Farm Products Grades and Sales Act**, and as such, **they are responsible for the grades of potatoes offered to the consuming public in the areas mentioned.** Each inspector has authority to:

(a) enter any premises, vessel, boat, car, truck or other conveyance used for the storage or carriage of any farm product and inspect any farm product found therein;

(b) stop any conveyance which he believes to contain any farm product and inspect such conveyance and any farm product found therein;

(c) obtain a sample of any farm product at the expense of the owner for the purpose of making an inspection thereof;

(d) require the production or furnishing of copies of or extracts from any books, shipping bills, bills of lading or other records relating to farm products.

The **first duty** of each inspector is to carry out and **enforce provisions of the Act** under which they operate, **with regard to grades and identifications** as follows:

No person shall pack, transport, ship, advertise, sell, offer for sale or have in possession for sale any produce,—

"unless the produce has been graded, packed and marked in accordance with the provisions of the act and these regulations."

Following are the officers of the Department of Agriculture with *authority under The Farm Products Grades and Sales Act* governing Domestic and Export sales of Table Potatoes and Turnips in Ontario.

DOMINION DEPARTMENT OF AGRICULTURE

Name	Address	Title
H. H. Ponton	Box 520, Hamilton, Ont.	District Inspector, Western Ontario
C. W. Jackson	160 Front St., Belleville, Ont.	District Inspector, Eastern Ontario
P. W. Clement	Dominion Public Bldg., Winnipeg, Man.	District Inspector, Northwestern Ontario
R. R. Long	Box 520, Hamilton, Ont.	Supervising Inspector
E. A. Eardley	59 Victoria St., Toronto, Ont.	Supervising Inspector
W. F. Strong	Box 218, Guelph, Ont.	Supervising Inspector
J. J. Johnson	Box 325, London, Ont.	Supervising Inspector
Harry Scott	565 King St. West, Chatham, Ont.	Supervising Inspector
E. A. Walton	Newcastle, Ont.	Senior Inspector
Leslie Sturdy	224 Merritt St., Merritton, Ont.	Senior Inspector
C. A. Pews	Wheatley, Ont.	Senior Inspector
Howard Ellis	Leamington, Ont.	Inspector
Robert Austin	Arkona, Ont.	Inspector
Wm. Bowman	Box 520, Hamilton, Ont.	Inspector
H. Gandier	Meaford, Ont.	Inspector
E. James	Bradford, Ont.	Inspector
E. W. Stanley	Clinton, Ont.	Inspector
J. W. Long	Innerkip, Ont.	Inspector
W. Corp	Tavistock, Ont.	Inspector
J. R. Elliott	Bright, Ont.	Inspector
C. H. Bowman	R.R. 1, Ariss, Ont.	Inspector
J. J. Benn	Lucan, Ont.	Inspector
R. G. B. Whitty	R.R. 5, Barrie, Ont.	Inspector
W. R. Breckenridge	Innerkip, Ont.	Inspector
R. B. Wingrove	R.R. 3, Guelph, Ont.	Inspector
W. J. Schneller	Baden, Ont.	Inspector
Herman Stainton	Blackwater, Ont.	Inspector
A. C. Kingsbury	Rockwood, Ont.	Inspector
J. L. Walker	Box 51, Walkerton, Ont.	Inspector
G. F. H. Sumler	968 Colborne St., Brantford, Ont.	Inspector

Name	Address	Title
S. A. Brohman	Mildmay, Ont.	Inspector
Everett Mark	Little Britain, Ont.	Inspector
R. N. Scott	R.R. 6, Guelph, Ont.	Inspector
W. H. Drummond	R.R. 1, Waterdown, Ont.	Inspector
Frank Marvin	Trenton, Ont.	Inspector
Claude Teskey	Picton, Ont.	Inspector
O. R. Totten	Box 325, London, Ont.	Inspector
C. H. Pickett	Box 520, Hamilton, Ont.	Inspector
N. C. James	1486 York St., Windsor, Ont.	Inspector
C. A. Webster	59 Victoria St., Toronto, Ont.	Inspector
Mel Sutherland	59 Victoria St., Toronto, Ont.	Inspector
G. Ellsworth	480 Van Norman St., Port Arthur, Ont.	Inspector
D. H. Firth	15 First Ave., North Bay, Ont.	Inspector
G. R. Shouldice	Fruit and Vegetable Div., Dept. Agric., Ottawa	Inspector
J. Marshall	Fruit and Vegetable Div., Dept. Agric., Ottawa	Inspector
W. G. Harnden	Colborne, Ont.	Inspector
B. Dobson	59 Victoria St., Toronto, Ont.	Inspector
W. Hewitson	59 Victoria St., Toronto, Ont.	Inspector

ONTARIO DEPARTMENT OF AGRICULTURE

Following is a list of Inspectors employed by the Ontario Department of Agriculture with authority under The Farm Products Grades and Sales Act governing domestic sale of table potatoes and turnips in Ontario:

Name	Address	Title
Warren McNiven	Fruit Branch, Parliament Buildings, Toronto, Ont.	Chief Inspector
Robert A. Craig	Fruit Branch, Parliament Buildings, Toronto, Ont.	Supervising Inspector
Marian Collinson	Fruit Branch, Parliament Buildings, Toronto, Ont.	Consumer Surveys
H. C. Foster	Brighton, Ont.	Supervising Inspector
A. E. Bell	59 Victoria St., Toronto, Ont.	Supervising Inspector
Harry Greenwood	Fruitland, Ont.	Supervising Inspector
Lewis G. Howe	59 Victoria St., Toronto, Ont.	Supervising Inspector
John Janzen	R.R. 3, Kitchener, Ont.	Supervising Inspector
Glen H. Henderson	Box 419, Bradford, Ont.	Supervising Inspector
Douglas E. Williams	Wheatley, Ont.	Supervising Inspector
Kenneth H. Hunter	Box 910, Thornbury, Ont.	Supervising Inspector
L. W. Watson	Box 704, Gravenhurst, Ont.	Inspector
Reid Dunham	Box 520, Hamilton, Ont.	Inspector
Geo. Hackett	Box 274, Cochrane, Ont.	Inspector
Ernest Roberts	Box 974, Creemore, Ont.	Inspector
Rheal Belisle	R.R. 1, Chelmsford, Ont.	Inspector
James Inrig	Wheatley, Ont.	Inspector
Frank Dobson	Box 113, Orangeville, Ont.	Inspector
C. A. Hare	59 Victoria St., Ont.	Inspector
Joe Marchildon	R.R. 1, Penetang, Ont.	Inspector
William Smith	Box 704, Gravenhurst, Ont.	Inspector
Robert Burnside	59 Victoria St., Toronto, Ont.	Inspector
Arthur Scott	59 Victoria St., Toronto, Ont.	Inspector
James Lovekin	59 Victoria St., Toronto, Ont.	Inspector
Murray H. Hogle	R.R. 3, Port Dalhousie	Inspector

CERTIFIED SEED POTATOES

Field Standards

	Total All Diseases	Foreign Varieties	Bacterial Ring Rot
Certified Class	3%	0.1%	none
Foundation A Class — planted in units	2	0.1	none
Foundation A Class — not planted in units	0.5	0.1	none
Foundation Class	0.1	none	none

Only fields planted with Foundation A or Foundation grades of seed are eligible for certification inspection.

Further particulars regarding regulations governing the production and sale of Canadian Certified seed potatoes may be obtained direct from Plant Protection Division, Science Service, Dominion Department of Agriculture, Ottawa, or from the following:

H. W. WHITESIDE, Post Office Box 129, Barrie
W. L. S. KEMP, Ontario Agricultural College, Guelph
O. W. LACHAINE, Science Service Bldg., Central Experimental Farm, Ottawa
F. J. HUDSON, Post Office Bldg., London
D. J. PETTY, 722 Dominion Public Bldg., Winnipeg, Man.

Persons interested in Seed Potato Certification should get in touch with the nearest seed potato official for their district. Field Inspection may be obtained *without charge*, with the acceptance of properly completed application forms, made on or *before June 15th of each year* to any of the offices of the Dominion Seed Potato Certification Service as listed above. Agricultural Representatives in each County and District will also be glad to provide further information, for your assistance.

Farm storages like this are on almost every farm in some sections.

A laugh is worth a hundred groans in any market. — LAMB.

TURNIP GROWERS' MEETING

Lewis Thomson, Embro

CHAIRMAN'S REMARKS

ANOTHER year has rolled along and time for the Annual Meeting of the turnip section of the Crop Improvement Association.

1949 will long be remembered by all connected in any way with turnips. For some growers it meant an all time high price for the fall season showing an average price of 75c. per bushel to the grower. For others it meant aphids, two and three plantings lost, much money and work spent with no return. It meant nearly double average income per acre for some and nothing for others.

This condition resulted in a direct loss to many growers and an overall loss to Ontario of many U.S. dollars, yet much was gained in respect to seeding times and insect control as our O.A.C. responded very quickly when alerted to the menace at hand.

Groups of figures become very boring and tiresome, yet permit me to draw attention to some that seem outstanding this year when the overall output is small. In one district in North Oxford covered by one inspector there were 169 cars of Ontario turnips shipped out in a two month period, October 24 to December 24. These 169 cars, plus some truck movements contained 110,000 bushels at an average price of 75c. per bushel to the grower which is $82,500.00, the Ontario farmers in this district received. An average price of $1.50 per bushel in United States makes $175,000.00 of good 110 cent American dollars that this one small district has brought into Canada in a poor year.

With that thought in mind, and with the aid of the elements, let us try to make 1950 a year when we will have pleasant memories of good crops and fair prices to all. Let us ship to our good neighbours in U.S. and to the lady who should have top preference, the Canadian Housewife, turnips carefully packed, and properly graded, without that one or more culls that unfortunately slips into the bag. Let us ship "Choice Ontario Turnips" and feed those vitamin packed culls and poor shaped specimens to our cattle. They appreciate them and the housewife doesn't.

May I say this point was referred to by Mr. A. A. McTavish, in his opening remarks to the turnip section last year and I quote Mr. McTavish — "The only comment I wish to make with regard to marketing is to suggest that I hope something is done soon to improve the quality of a great many of the turnips we have seen in Ontario grocery stores in recent years."

To improve this condition, we must all pull together, grower-inspector and shipper to keep Ontario "First in the turnip industry" by offering for sale and shipping only "Choice Ontario Turnips."

SOME INSECT PESTS OF TURNIPS

by Dr. John Oughton, Ontario Agricultural College, Guelph, Ont.

CONTROL of insect pests is the main problem confronting turnip growers of Ontario. During the past summer, aphids and flea beetles destroyed turnip plantings in many areas of this province. Since such severe outbreaks have been rare in the past, it seems unlikely that they will occur soon again. In any case, we have insecticides that will check such attacks. In the long run, root maggots cause the greatest loss to the grower. At present we have no effective means of combatting this Number 1 turnip enemy.

Aphids ("Lice")

With last year's experience in mind, it will be wise to search for early signs of aphids and apply treatment before these pests become widespread. Look for greenish, olive-coloured, whitish or dark insects 1/15 inch or smaller, underneath the leaves, in the buds and axils.

Plant symptoms — Aphids suck the juice from the leaves, the green colour changes to yellow and brown and finally the leaf becomes thin and dry.

Treatment — Apply a spray of 15% wettable parathion — ¾ lb; water — 50-100 gallons, to treat one acre. A potato sprayer seems to give good results on field trials. A knapsack type sprayer will serve for small patches.

Flea Beetles ("Turnip Fly")

These are small black beetles 1/12 inch long having two inconspicuous wavy yellowish stripes. They are so small and active that they are frequently overlooked by the farmer.

Plant symptoms — Small pock-markings and holes are made in the leaves and stems. These weaken the plants.

Treatment — Dust or spray with DDT, or if parathion is used to control aphids, no additional measures may be necessary for flea beetles.

NOTES ON PARATHION

1. *Residues* — Chemical analyses of soil, peel and pulp made by Prof. L. A. Birk of the Department of Chemistry, O.A.C. indicate that if the grower carefully follows the recommendations of dosages and timing, no hazardous residues will result.

2. *Residual action* — a few days only; if the aphids persist, as happened in 1949, then additional sprays will be necessary.

3. *Taint* — none found.

4. *Precautions*

   (a) Carefully read and follow directions contained in the package;

   (b) Protect skin and clothing from powder or spray;

   (c) Do not apply within the 30 day period proceding harvest.

Root Maggots

Root maggots kill some seedlings. If they establish themselves in slightly older plants, they may eat through the slender root, which grows into a stubby rooty turnip. But the greatest injury is the scars and burrows and the rot which starts from these tunnels.

LINDANE (high gamma benzene hexachloride).

Dosage: Lindane 25% wettable — 4 lbs.; water — 80 gallons; to treat one acre.

Test 1: 6 treatments of above spray applied at weekly intervals gave some control of root maggots; but the turnips were tainted (taste rating of 8*).

Test 2: 3 treatments of above spray applied at two week intervals gave less control than Test 1 and produced a taint of taste rating 6*.

*Samples of turnips were cooked and tested by Prof. E. W. Franklin and Miss T. Gilliat. By their system, a rating of three or above would probably be inedible to most persons.

PARATHION

Dosage: parathion 15% wettable — 1 lb.; water — 50-100 gallons; to treat one acre.

Test 1: 6 sprays (as above) at weekly intervals.

Members — Turnip Committee Ontario Crop Improvement Association, after a meeting.
Left to Right — Harold Shantz, New Hamburg, Harry Hossfeld, Walkerton, I. K. Martin, Galt, John Winer, Guelph, Frank Strong, Guelph, H. Scrini, Toronto, Harold Hunter, Exeter, Lewis Thompson, Embro, George Gear, Walkerton, J. J. Johnson, London, H. H. Ponton, Hamilton, Irwin Scott, Lucan, Chairman, A. H. Martin, Toronto, R. E. Goodin, Toronto, Secretary, Prof. J. Laughland, Guelph, W. Corp, Tavistock, Past Chairman, R. E. Brown, Stouffville, C. Stovell, Toronto, Warren McNivan, Toronto

Test 2: 3 sprays (as above) at intervals of two weeks.

Remarks: Our tests as well as those carried out by farmers, indicate that parathion does not seem to show much promise as a control measure for root maggot. Neither tainting nor plant injury was observed with this material.

Recommendations for 1950

1. Turnips should not be allowed to grow in last year's field.
2. Choose a field which is as far as possible from all turnip fields of the previous year.
3. Root cellars — carefully clean the floor and bury the refuse at least a foot deep.
4. Manure — we do not yet know whether this attracts root maggot flies or not. In any case, to be on the safe side, if the grower applies manure, he should do so in the fall, ploughing and working the land then, too.

ACKNOWLEDGMENT

The lindane was supplied by the California Spray — Chemical Corporation.

Courtesy of Farmer's Advocate

FIVE TURNIP BOOSTERS AT THE CROP IMPROVEMENT CONVENTION.
From the left: Irvin Scott, Lucan; H. H. McNish, Lyn; Lewis Thomson, Embro; W. F. Strong, Guelph; R. C. Thompson, Lynden.

A RATIONAL APPROACH TO THE FERTILIZATION OF THE TURNIP CROP

by R. J. Bryden, Soils Department, O.A.C.

IT IS needless for me to say that I am pleased to have the privilege of discussing this subject with you as it affords me an opportunity to lay before you a plan of soil management that I feel is practical, sound and if carried out will meet with the approval of anyone interested in the best possible land use as well as in Soil Conservation.

For a number of years now the shipment of turnips or as the Americans call them "Rutabagas" to the United States market has been around the three million bushel mark and there is no reason why with the increasing population in the United States that this market can not be enlarged if the quality of product is kept at a high standard.

During the past year, owing to the great damage done by aphids the crop in Ontario was practically ruined causing a great loss of revenue to a large number of Ontario farmers. In this connection, I might add that four demonstration experiments which were layed out in the territory I supervise in Western Ontario were completely destroyed by the above mentioned pest in spite of the fact that they were sown three times in each instance.

Turnips can and are being grown successfully on a fairly wide range of soil types in Western Ontario. Yields vary considerably depending on weather conditions during the growing season, as well as on soil type and fertility levels encountered. While the fertility level of a soil is very important to the growing crop, I would like to emphasize the necessity of keeping the physical condition of the soil at an optimum level, thus ensuring adequate aeration and optimum water holding capacity for any particular type of soil.

In order to obtain the best possible yield of turnips it is necessary for the grower to take into account the soil he is working with and to appraise it from every angle in order to make the necessary adjustments to correct the deficiencies that can and need to be corrected. In other words make a study of the soil and try to correct its faults.

As previously stated, turnips are grown on a wide variety of soil types such as Huron and Perth Clay Loams, Harriston Loam, Guelph Loam, Waterloo Sand, Berrien Sandy Loam, Brookston Clay Loam and many others. These soil types vary in several ways as far instance in amounts of organic matter they contain, in their reaction, as well as the level and the availability of nutrients, such as, phosphorus, potassium, magnesium, nitrogen, calcium, etc. From the standpoint of physical characteristics which are of prime importance in a soil affecting drainage, aeration and water holding capacity, there is a wide variation depending on the type of soil being considered. A light, open, porous, sandy type soil is as a rule well drained, well aerated and requires frequent applications of well rotted manure or sufficient green manuring crops to keep up organic matter content to enable it to hold more moisture and bind it together. On the other hand, a heavier clay type soil requires organic matter to open up to increase aeration and to prevent soil from becoming too compact.

In order to make a systematic study of the soil to determine its deficiencies and therefore its requirements, let us look at a soil — any soil, to see how and of what it is constituted. Let us also try to determine what goes on in the soil and how plants grow.

First of all we can divide the soil into two main parts, the organic matter and the mineral portion. Anything in the soil that has or had life whether of plant or animal origin can be classed as organic material. The mineral portion of the soil is the rock material that the soil was formed from. It is in this material that the actual minerals existing in the soil such as phosphorus, potassium, iron magnesium, calcium, etc., exist.

In plain, simple language the bulk of the minerals required by plants is held in the rock or mineral portion of the soil. I would like to point out that soils vary a great deal as to their mineral content, not only as to kind, but as to the availability of the various minerals to growing plants.

It is very necessary to realize that a mineral may exist in a soil, but that it may not under certain conditions be readily available to the growing crop and for certain definite reasons. Therefore, when studying a soil to determine what treatment it should receive, this point must be very carefully considered.

Associated with the organic material in the soil, is also the various soil Bacteria, Fungi and Micro organisms. They play a very important role in breaking down organic matter in the soil with the consequent formation of CO_2 and the formation of organic acids which in turn act on the minerals in the soil making them available to the plants.

There are many factors that influence the growth and development of the various micro organisms in the soil, such as soil texture, closely associated with aeration, drainage, soil reaction, fertility levels, amount and kind of organic matter present. In order then to get the most out of a soil from the Bacteria, Fungi and various Micro organisms, we must keep the soil in a satisfactory condition so they can develop to their fullest capacity in order to contribute as much as possible to the crops we wish to grow.

It can be truthfully said that organic matter can be considered to be the key to the productive capacity of a soil. While that statement is not 100 per cent true since a soil could be well supplied with organic matter, but actually be deficient in readily available minerals so necessary to well balanced plant growth. Let us consider the role of organic matter in a soil. First of all it is the home of bacterial life in the soil. It is also the source of much of the nitrogen in other than leguminous plants. The primary source of nitrogen of course is the atmosphere and through the bacteria of the legumes the atmospheric nitrogen is built up into proteins within the plant which when on breaking down can be utilized by other than leguminous plants.

Organic Matter

The organic matter on breaking down in the soil causes carbon dioxide to be given off in the air, some of this is taken up by the plant and is a source of the plants carbon. Some of the CO_2 as mentioned before is taken up by the water of the soil to form carbonic acid. This acid in turn reacts with the minerals in the soil to make available the necessary mineral nutrients to the growing crop. I would especially like to point out that a soil must have minerals, such as phosphorus, potassium, magnesium, calcium, iron, etc., in adequate

amounts in the rock formation that the soil contains to give it a sustained mineral requirement or the minerals have to be added by means of commercial fertilizers to give the necessary balance to the nutrient level of any soil.

Many of you have heard the expression "that soil is sour." "I will have to use limestone to correct the acidity of the soil in order to grow Alfalfa."

Soil men use the term soil reaction to express the condition of a soil in regard to acidity or alkalinity. A soil containing an ample supply of lime is alkaline as far as its reaction is concerned. A soil deficient in lime will have an acid reaction. We use a numerical scale to describe the reaction in a soil, we could call this the pH scale. It expresses the degree of acidity of alkalinity. A soil that has a reaction of pH 7.0 is said to be neutral. There is a balance between acidity and alkalinity. If a soil had a pH of 4.5 it would be considered to be very acid. A soil having a pH value of 7.4 is alkaline. We can expect values from around 4.5 to 8.8. Most of our Ontario soils will have a range from 5.5 to 7.6 with a great many from 6.2 to 7.4. Soil reaction is very important and must be considered, as too low, or too acid a condition is detrimental to nutrient developments and availability in our soils. An acid condition tends to lock up phosphorus and potassium as well as make the soil very unfavourable for the growth of desirable Bacteria and Fungi, so important to Nitrogen development and the accumulation of organic material. Likewise a very alkaline condition ties up phosphates, boron, iron, magnesium, manganese and potassium.

For general farm crops under Ontario conditions a pH range of 6.2 to 7.2 would be considered satisfactory providing enough water soluble calcium and magnesium are present.

To correct an acid condition one must not know only the degree of acidity but must have an idea as to the clay content of a soil as it requires more lime to raise the pH of a soil abundantly supplied with clay than a sandy soil low in clay content.

In order to get a satisfactory appraisal of soil reaction and nutrient levels in the soil we are working with, it is advisable to have a soil analysis made of the soil, to get this information. I would like to point out that soil analysis will not solve all of the problems in connection with our soils and that no method of soil analysis is 100 per cent perfect, still it does, if properly understood and interpreted give us a picture of the fertility levels and can be of great value in arriving at the production capacity of a given soil.

I would at this point like to stress the necessity of keeping up a good physical condition in our soils in order that the turnip crop when sown will grow rapidly and produce a crop of high quality. Most turnip men that I have had anything to do with really appreciate the necessity of good tilth and are fully aware of the importance of sufficient organic matter in the soils they plan on using for turnips.

We find that more turnip growers are using clover sods when possible and are putting on the necessary manure a year in advance of sowing turnips, as a control measure for root rot and maggot infestation.

Most growers of turnips are aiming at growing in the neighborhood of 1000 bushels of turnips per acre. One thousand bushels per acre is looked

upon as a very satisfactory crop and in order to produce a crop of that size a soil has to be in good physical condition and well supplied with the necessary nutrients. Weather conditions must as well be satisfactory.

A one thousand bushel crop will require approximately 100 pounds of actual nitrogen, 55 pounds P_2O_5 (Phosphorus) and 125 pounds K_2O.

In terms of fertilizing materials this means:

NITROGEN in form of Sulphate of Ammonia	500 pounds
PHOSPHORUS in form of Superphosphate 20%	275 pounds
POTASSIUM in form of Muriate of Potash	250 pounds
TOTAL	1,075 pounds per acre

of actual fertilizing materials to produce a one thousand bushel crop of turnips.

In order to maintain adequate fertility levels in our soils it will be necessary to put back as much as possible to crop residues and manures as well as commercial fertilizers to keep a sufficiently available supply of plant nutrients to produce the crops we desire.

This can only be done if we make the best possible use of the land we are cultivating and see to it that we follow a satisfactory rotation having in mind the keeping up of organic matter to preserve the best possible tilth in our soils and to maintain a sufficiently high available mineral level as well.

In order to do all of this it will be necessary to use commercial fertilizers judiciously. It will also be necessary to use cultural practices in keeping with the type of soil one has to work with. There is no hard and fast rule to follow as far as cultural methods are concerned, but one has to be governed by actual existing conditions and use the tool or implement that is best suited to the particular condition of the soil he is working with. It is important to prepare the soil so as to put it and keep it in the best possible state to produce a good crop.

Fertilizers Profitable

It is my considered opinion that fertilizers can be used profitably if used wisely and there have been many demonstrations carried out over the past number of years to substantiate this claim. I maintain that there can be no blanket recommendation made for fertilizers to suit any crop to cover all soil conditions.

I believe also that moderate amounts of fertilizers used frequently will pay greater dividends than large amounts at greater intervals.

I will now list a number of Demonstration Experiments that have been carried out during the past several years.

NAME	TREATMENT	AMOUNT (POUNDS)	YIELD (BUSHELS)
R. J. McCormick, Paris	0–12–5	375	1,023
	0–12–10	375	1,155
	–0–	375	825
	2–12–6	375	1,140
	4–21–6	375	995
Ernest Buck, Paris	2–12–10 +Borax	250	623.6
	2–12–10 +Borax	500	822.8
	–0–		598.4

Name	Treatment	Amount (Pounds)	Yield (Bushels)
P. Wilson, Pakenham	2–12–10	500	1,184
	–0–		890
T. A. Gallagher, Orangeville	4–8–10	500	721.9
	0–14–6	500	658.2
	0–16–0	500	684.9
	–0–		505.1
J. Meek, Orangeville	2–12–6	500	840
	0–14–6	500	720
	–0–		640
H. Shaw, Markdale	4–8–6	500	740
	–0–		600
A. E. Cooper, Fordwich	0–12–5	375	1,100
	0–12–10	375	1,180
	0–12–15	375	1,280
	–0–		840
D. Rumney, Gormley	0–12–10	375	1,000
	2–12–10	375	1,280
	–0–		800
H. Hossfeld, Walkerton	2–12–6	325	971
	2–12–6 +Potash	325 200	994
	2–12–6 +Super Phos.	325 100	926
	2–12–6 +Super Phos.	325 200	904
	2–12–6 +Super Phos.	325 300	1,039
	–0–		791
Hunter Bros., Exeter	Super Phos. +2–12–10	200 200	1,066
	Super Phos. +Potash +2–12–10	200 200 200	1,170
	Potash +2–12–10	200 200	1,150
	2–12–6	300	918
	–0–		857
	Salt	400	793
	Salt +2–12–6	400 300	940
Herb Holtby, Innerkip	4–8–10	300	853
	4–8–10 +Potash	300 200	970
	4–12–10	300	920
	4–12–10 +Potash	300 200	916
William Elliott, Guelph	2–12–10 +Potash	300 200	1,144
	2–12–10 +Potash +Salt	300 200 300	946
	2–12–10	600	946
	–0–		660

These demonstration tests indicate that fertilizers increase the yields of turnips in most cases and that the increased yield is sufficient to more than cover the cost of the fertilizers used.

From a study of fertilizer rates, analyses, and yields it is very evident that there can be no blanket recommendation made for any particular analysis or rate of fertilizer application to suit all soil conditions. It will be necessary therefore, to suit the analysis and rate to the particular conditions of any given field.

In order to do this it will be necessary to have a soil analysis made so that the existing fertility levels of any soil can be appraised. Soil tests should be made through the rotation period in order to get a true picture of the fertility levels. By having your soil checked in this manner it will enable one to determine the best analysis and rate to use which should help in increasing yields and maintaining a high standard of quality.

The application of fertilizers should be considered as I believe that crop response can be greatly affected by the method of application. Most growers use the fertilizer drill or spreader to apply the fertilizer previous to ridging and sowing the seed.

Perhaps by having the fertilizer applied directly under the seed at time of sowing we could expect a greater return for amount of fertilizer applied.

Photo shows Mrs. Keith Hope, niece of the farmer whose property was completely "remade" carrying out a five-year program in one day, who is standing in a completely modern kitchen at the farm home. Its installation was one of the features of the unique day's program carried out under auspices of the Ontario Crop Improvement Association at Canada's first Conservation Day near Brooklin. The kitchen is on a par with any modern city home with electric refrigerator, stove, modern sink and cupboards, venetian blinds and modern drapes.

While we have done considerable experimenting with fertilizers, there still remains much to be done. We are hopeful of being able to co-operate with you men in the future and wish to assure you that we in the Soils Department at the College are desirous of helping in every way possible to keep the quality and quantity of Ontario Rutabagas at a high level on the local as well as United States markets.

FERTILITY FOR TURNIPS

by R. J. Pollock, Keswick

WHAT I briefly present for your consideration to-day is certainly not to be accepted as final authority on Fertility for Turnips. The material herewith is the product of my own experience and experiment, combined with personal contact with a fairly large number of turnip growers in many sections of the Province.

There is an ever increasing hunger on the part of most growers for more definite information concerning soil deficiencies, fertilizer requirements and cultural practices which will with the minimum cost return a higher yield and a better quality turnip. This hunger for knowledge is being satisfied in part, at least, in three ways.

First: The farmer's experience and experiment.

Second: The interest in our problems and the work done by the College at Guelph.

Third: The friendly eagerness of the farmer to "share what he knows" and "Show what he grows" to his neighbour.

In spite of all this, there remains much to be desired.

The season of 1949 was to have been my top year in conducting experiments with turnips and soils, but as you know we had one of the most extreme conditions of weather ever experienced in Ontario. Records for drought were broken daily and the result of heat and aphids was disastrous to growers in most sections of the Province.

In our planning for improving the turnip growing industry we must keep in mind "Fertility for quality" as first, and "Fertility for quantity" as second. It seems to me that too much stress has been placed on quantity production when what really is required is a higher quality product. Nothing can destroy our markets more quickly than a low quality product.

In 1948 while visiting a turnip area where water core was running well over 50% I contacted a farmer who was about to harvest a seven acre field of large rather rough turnips. The yield was high and turnips were free from water core, but they were too rough, too large, and rooty to class as good quality turnips. It was the opinion of this particular grower that his high production and freedom from water core was due to a heavy application of manure in the Fall and a further light application in the Spring. At least, he had obtained high production at the expense of good quality.

In 1947 on my own farm, I went to the other extreme. On a 10 acre field about 8 tons of manure per acre was applied in the Fall and in the Spring I

had a fertilizer company mix 20 lbs. of borax with 400 lbs. 2-12-6 fertilizer. This was sown on light ridges with a fertilizer attachment on the ordinary turnip drill.

Yield Low

I discovered to my surprise and cost that turnips germinated and developed normally only on small areas where no fertilizer was applied. On this field, the quality was excellent, but the yield was very low. The mistake is obvious. Borax, if mixed with fertilizer should be applied either broadcast or with grain fertilizer drill some time previous to sowing the turnips. It is generally accepted that borax should be dusted on the turnips.

In fertilizing for turnips, barnyard manure, in my opinion, has an important place. It also has its dangers. It should be applied during the summer preceding the turnip crop; and I would hesitate to apply manure that contained turnip clippings or decayed cull turnips to the field at any time. A combination of good barnyard manure applied in the fall and a commercial fertilizer applied at seeding time seems to be a sane procedure. This brings up the important question, what fertilizer should be applied? The answer requires a soil analysis to determine soil deficiencies. It also requires further experimental work by the growers in co-operation with the Department to determine the best fertilizer and the proper amount to use in the production of both quality and quantity. Last spring an analysis of my soil showed a deficiency of potash and this fact, coupled with the results of experiments carried out by other growers using extra potash, led me to use a 4-8-24 fertilizer on some turnip pests at the rate of 400 lbs. per acre, on other plots I used 2-12-6 with 200 pounds of muriate of potash added. I also used a 2–12–6 without the extra potash. All fertilizers were sown with fertilizer attachment on turnip drill and on shallow ridges. Unfortunately weather conditions were such that results were not conclusive enough and I plan to continue or repeat in 1950. I am convinced that the extra potash will show worth while results.

At the moment, I am particularly interested in long-term soil management with respect to turnips. We know that turnips are heavy feeders and require a high organic content in the soil. Fertilizer alone is a poor substitute for organic matter well rotted and worked into the soil. This calls for careful crop rotation. It is difficult to find anything to take the place of a good growth of red clover ploughed under to supply the desired humus. A general rotation now practised includes:

1946 — Mixed grain.
1947 — Clover, second growth ploughed under.
1948 — Wheat — Fertilized 200 lbs. 2–12–6. Wheat stubble worked with double disc early in fall. Ploughed later, manured if possible.
1949 — Turnips — Fertilized 400 lbs. 2–12–6 and potash.

To increase the organic matter further, it is my intention to sow rye in the Fall on the wheat stubble to be ploughed under in the Spring for the turnip crop.

In conclusion, I am sure, we are as turnip growers gratified to the men of the Department who have done such splendid work and taken so much interest in our problems. I feel that there is need for a closer contact between the Department and the grower to get the things you know into practice with us who grow, or try to grow, not a bigger but a better rutabagas.

TURNIPS AT THE "ROYAL"

by **George G. Reeves, Co-operation and Markets Branch, Ontario Department of Agriculture**

THE ROYAL WINTER FAIR has grown from a National Show to one international in scope.

The turnip industry fits in very well with this line of thought, because the marketing of this crop is also international in character.

For a few moments I would like to speak to you regarding the reason a good exhibit is of interest to the turnip industry. The Winter Fair is the best show window in the world for agriculture and this makes it very important that your industry play its part. It gives all growers a chance to compete with one another in a competitive way. Most of us are more or less gamblers at heart and once you start to take part in a competition of this kind, it gets into your blood and usually you keep coming back for more. If you win it gives you a warm feeling and if you lose, as all of us must at times, it makes you determined to do better next time.

The turnip industry, for the fresh market, is growing both here and in the States, and it is most important that the public be given a good impression of the quality of turnip that we produce in Ontario. The Royal is one of the best places to get this across to the housewife.

If I stray a little from my subject, as stated on the program, it is because in my work we are continually thinking "Marketing." So at this time I would like to stress that a job can be done at the Fair but you as growers and packers have even a greater responsibility in the quality and grade of turnip you offer for sale. Agriculture appears to be facing a period of surpluses, and there are very likely to be quite a few farmers dropping the production of one line and getting into a different cash crop. It might be turnips. But, Mr. Chairman, I feel sure that if care is taken in the quality that you offer for sale, you will find no difficulty in disposing of all the turnips you produce. What the consumer wants, is the kind you have to pack and sell if you are going to stay in business.

Any of you who take an interest in the Royal know that until last year's Fair turnips were just a part of the vegetable exhibit. Last year, through the efforts of your Secretary, Mr. Goodin, the turnip classes were revamped. At the 1948 Fair our entry was 32 in all classes. There was $52.00 in prize money offered for these classes. One class was shown in hampers and I know you will agree this does not make a very good exhibit.

Changes Come

In 1949 prize list brought a number of changes, both in the classes and the prize monies offered. There was an additional class added for six specimen waxed. Instead of 32 entries these were increased to 58 entries, and the prize monies were increased to $90.00.

Also the method of exhibiting them was changed. We did our best to make an exhibition of them and using triangle forms on a sloped table. This arrangement can and will be improved.

Another important change made was to bring in a man whom we felt was qualified to judge turnips. This change was worthwhile.

There were some exhibitors who thought the wording of the list last year was confusing and this will be remedied this year.

I would like to point out, Mr. Chairman, the changes that were carried out in the last year or so are just the beginning of making the turnip section of the Fair bigger and better. Last year's display was the best in the history of the Fair, both in quality and number of entries, and this in a poor turnip year, and the public, and what is more important still to those of us on the Committee, the Fair officials, were very favourably impressed with it. The exhibit stands up very well, and this is quite important to any Fair.

This year we intend, your Secretary and I, to make suggestions for further changes in the turnip classes to the Fair Committee.

As the unwaxed turnip does not stand up very well, we are suggesting it be deleted and in its place another class of 21 specimen waxed be added. This would give two size ranges in the 21 specimen class. As far as prize monies are concerned, we hope also to make improvements there.

Another suggestion we have to make is for a commercial exhibit to cover possibly 30 sq. ft. of space.

A championship trophy is another thought. Whether this can be worked out this year is not known at the present time.

In closing, Mr. Chairman, I would like to thank you and your Association for their co-operation in the past and say also that we would appreciate any suggestions you have to offer that will make the turnip section of the Royal bigger and better in 1950.

A group of Ontario potato people are shown with Hon. A. C. Taylor, Minister of Agriculture for New Brunswick and G. C. Cunningham. Left to Right — Mr. Cunningham, Director of potato research and Marketing for New Brunswick, Hon. A. C. Taylor, R. E. Goodin, Toronto, L. C. Roy, Toronto, Thomson Banting and Eugene Smith of South Simcoe.

NORTHERN ONTARIO MEETING

QUALITY IN NORTHERN ONTARIO SEEDS

by Raoul Hurtubise, Dominion Seed Inspector, New Liskeard

NORTHERN ONTARIO with its wide variation of rich soil and climatic conditions favourable to rapid growth lends itself nicely to the production of grass and clover seeds, seeds of cereals of the early varieties and potato seed, all of which have outstanding merits and qualities in respect to plumpness, purity, relatively disease-free, high viability and hardiness. On numerous occasions when displayed at some of our most important seed fairs, our Northern grown seed, when shipped to the United States and as far away as the Maritimes, has brought back expression of satisfaction through words and repeated orders.

When we consider the long distances over which our seed had to be transported before being landed in competition with local supplies or that which was produced on closer ground; surely there must be something superior about our Northern grown seed that commands such attention. I may add that, presently, demand for our seed by far exceeds supply.

There is no doubt that Northern Ontario, as a potential source of good seeds, offers great possibilities. Each year, fairly large surpluses of these crops are produced above our own requirements. With careful preparation, these surpluses could be made available to the seed trade. Last year, Temiskaming alone could dispose of some 20,000 bushels of seed oats, mostly of the Registered and Certified grades. What was accomplished there could be repeated many times over such a wide area of fertile soil in the hands of well established farmers.

The experience acquired in that field of activities should prove to be of great value to any other section that may wish to join in the venture. I may assure you outright that this enterprise of catering to an outside seed market carries its many problems and complications. It is no easy road that leads to such a goal which can only be reached through careful planning, determination and sustained efforts.

Grains Needed

I will admit that, at present, most of our farming sections find their main activities in the dairy industry with the production of beef, pork and poultry being given more and more attention. However, you will agree with me that to keep livestock requires a fairly large supply of hay and concentrates in the way of homegrown grains. In order to have enough, usually, surpluses are produced. Disposing of these offers no easy problem and to my notion this is where seed production could come in as a complement to these activities contributing, in no small measure at times, to the yearly income. For instance, this year Temiskaming has produced about one million pounds of timothy seed and some 100,000 pounds of red clover seed. Figured at an average price of 20c. per pound, basis rough, for the timothy, and 35c. per pound for the red, on primary cleaning, you can very well visualize the handsome sum of money left by these crops with our Temiskaming farmers, and this at no detriment to their dairy or other activities, I am sure.

To achieve any worthwhile success in catering to the seed market, careful planning becomes a necessity. Certain essentials cannot be over-looked such as the use of good seed, producing bulk, organizing processing centres and providing for some storage facilities.

The use of good seed of a suitable variety or type adapted to your own section is the very foundation of good and abundant crops. Uniformity of crops helps to make quality. The farm should be no common place for experimenting with varieties, and sections where we find as many varieties as we have, farmers cannot be productive of good seed. It is the multiplicity of surpluses, regardless of size, as long as these are of the same variety or type, that permits easy bulking which in turn permits suitable selection toward quantity and quality.

Processing is made possible only where we have a properly localized and fully equipped stationary cleaning centre. In this respect, we are falling short of our requirements in Northern Ontario. Coupled with the use of good seed no other factor will contribute more than this one to rid our farms of their weeds, improve the quality and yields of our crops and assist in the disposal of our surpluses as good seed. Also, if you are to get the most for your seed, it must be finished at home. This is especially true when it applies to small seeds. Had the Temiskaming growers this year, taken full advantage of their local facilities in this respect, they could have bettered very materially their revenues.

Furthermore, if you are to cater to any seed market, you need storage facilities. To compete on these markets, you must have quantity, and all of that seed must be properly graded and suitably packaged in readiness to fill any forthcoming order, even on short notice, as is often the case. This is where we find most of our problems and complications. Presently, with such a narrow margin in the prices between Registered and Commercial No. 1 seed, the demand is for the Registered No. 1, which is of a very high standard not easily attained. This is where we must have not only suitable type but also bulk to choose from.

I regret that time will not permit me to elaborate any further on these various points so necessary to bring out the quality of our Northern Ontario grown seeds. If Temiskaming has met with a fair degree of success in its seed business, it is precisely because it has, under clever management, I must admit, complied reasonably well to all of these essentials. No doubt, there is yet plenty of room for improvement. However, I am confident that if our present Registered seed growers will remain determined to stay in the game, regardless of the conditions prevailing at times, and provide that section with a constant and uniform supply of good seed and if, furthermore, there is sustained effort towards providing their co-operative with the required material, then, and only then, can they retain what they have acquired with difficulty and even achieve greater success.

Cater locally

From what has just been said, it becomes very conclusive that any section in Northern Ontario that cannot comply with these conditions should be satisfied with catering only to its local seed requirements. To go beyond this limit prematurely would tend to impair the progress already accomplished elsewhere.

In the way of possibilities, I would like to see the Manitoulin Livestock Co-operative take the initiative of organizing on the Island a good cleaning centre. Amongst the many services it would render, it could promote the production of substantial quantities of Common red clover and alfalfa seeds, the quality of which cannot be equalled anywhere else in Ontario if not in Canada. With no detriment to their other activities, I believe a profitable line could be developed, on the Island, in that direction.

The Verner section, through their co-operative, could also plan seed production. Here again, to my notion, are real good possibilities.

In conclusion, I would like to say, in view of improving our Northern grown seeds, that throughout Northern Ontario, there is room for a greater distribution of Registered and Certified seeds of the proper varieties and types.

Gordon Leitch, owner of Leitchcroft Farm, Gormley, looks over his winter wheat with Col. the Hon. T. L. Kennedy, Minister of Agriculture.

WHAT AUTHORITIES SAY

The person who wants to reduce should cut down food intake about 1,000 calories, but above all should not skimp on such protective foods as potatoes.

BUREAU OF HOME ECONOMICS, Washington, D.C.

PROFITABLE CROPS IN NORTHERN ONTARIO

***by* Stanley Anderson, Powassan**

THE TERM Northern Ontario includes an area so vast in extent and so varied in physical make-up that you men who are from the North will realize the difficulty that I will have in speaking on this topic which has allocated to me for presentation at this time.

In width it extends from Mattawa in the East and westward to Port Arthur, Fort Francis and Kenora and in length from the green waters of the Severn to Kapuskasing and as far north as you could want to go.

Scattered throughout the vast area but mostly along the railroads and the shores of Lake Superior are pockets of land, large and small that are suitable for agriculture and which have been settled and developed in the past fifty years. One of the best of these areas is known as the Little Clay Belt of the Temiskaming District.

There are several factors which limit and control the kinds and varieties of crops grown in any country. These are climate, soil, markets and personal and economic factors.

Climate

Northern Ontario lies north of 46 degrees latitude and between 80-85 degrees longitude. In 1949, we had an average rainfall of 29.5 inches and recorded snowfall of 94 inches. In some sections killing frosts occur as late as June 15 and as early as September 1. Thus it can readily be seen that only those crops that are hardy and early maturing can be grown profitably.

Soil

In the region from Orillia to North Bay and through to the Soo the farm lands are small and irregular and consist of various soil types. For the most part this land is stony and poorly drained. A seepage coming from the bush land surrounding the fields keep this land cold and hard to manage. Scattered through this area are a few full-time farmers located on the best of the agricultural areas which are limited in number because large tracts of land that appeared to be a rich dark chocolate brown loam when covered with maple forest, have now become dry, barren, cinnamon brown sand.

However, it is a beautiful country covered with maple and birch forest and studded with innumerable lakes. Fishing and hunting attract thousands of tourists annually to this area which is known as the "Play-Ground of the North." Many farmers capitalize on this tourist trade by renting cottages, boats, etc. to the tourists.

Further North lies the Rainy River and the Cochrane clay belts which are rapidly being settled and producing many profitable crops.

Forests

It is the forests which protect and supply our lakes and rivers and streams with a steady flow of water, which is so necessary for fish and wild life. Though not originally considered to be a crop in the true sense of the word, we should recognize that if they are conserved and maintained they will continue to be our main source of revenue in the North.

The study and practice of selective planting and cutting of trees will ensure the farmer of a continuance of the revenue he derives each winter from the sale of timber, pulp-wood, fire-wood and maple-sugar products and also in the summer of the sale of his meat, dairy products and vegetables to the tourist trade.

Hay

I believe that the most valuable crop that we grow in the North is our hay crop. Despite the havoc that is sometimes wrought by the elements, wind, hail, rain, drought and frost, by and large we always seem to be able to fill our barns with hay. In the past the demand for hay for the lumber camps was for timothy and filling the needs of this market has to a certain degree, discouraged the use of legumes. There has been a tendency on the part of many farmers to pay little attention to soil management and to continue to grow hay on the same fields for eight or ten years, removing essential elements and making no effort to retain or increase the productiveness of the soil. Where farmers follow good soil management, yields of 2-3 tons per acre are harvested each year.

Of late years the Crop Improvement Association has conducted many experiments with new types of clover such as Ottawa strain Red, Altaswede, Alfalfa and grasses such as Ladino, Orchard and Brome in an effort to compliment the standard mixture of Timothy, Alsike and Red Clover. In many areas the application of lime has been found very necessary to the growth of legumes and as I said before, where good soil management is practiced the growing of hay will probably remain the most profitable part of our farming program.

Pasture

Over the years Northern Ontario has had ample rainfall well distributed through the growing season. Each farm has a considerable acreage of rough or natural pasture which up till the present time have needed little attention. However, with the advent of the dairying industry, these rough pastures which have now become infested with paint brush and other weeds are inadequate for our needs. Again with the encouragement of the Crop Improvement Association, we are experimenting with and trying to establish long term pastures, seeded with grasses and clovers suited to the various soil types. By controlled grazing and clipping when necessary, these pastures are producing longer lasting, more abundant and better quality pastures, which in turn lowers the cost of producing milk and beef. It would seem that in future, we will depend more and more on this improved pasture and some of the rocky pastures should in many instances be planted with trees.

Seed Products

Northern Ontario while limited in the number of cereals that can be profitably produced, such as Oats and Barley, has of recent years become recognized as a source of seed grain, grasses and clovers. These seeds are in good demand because of their quality and hardiness both in our local market and in other markets of Ontario. We have found that seeds grown in the North give us a surer crop than those brought in from more southerly areas.

Besides supplying our local needs several car loads of grain and grass seeds are annually shipped from Timiskaming District where a co-operative seed cleaning and distribution centre has been established.

Rainy River and Algoma districts have been producing good quality Alfalfa seed.

Particularly in the Sudbury and Cochrane districts the production of table stock and seed potatoes has been one of the most profitable Agricultural industries of the North. Realizing that to hold this market and the necessity for the proper standardization of grades, two large potato storages and Co-operatives have been erected in each of these potato growing areas. By this means the value of the crop has been increased as with proper storage the product can be marketed more economically by a more even distribution of supplies. New seed varieties, disease resistant and early maturing that have been introduced in the past few years have been a great boon to the Northern farmer. Eventually the production of silage corn will push farther and farther north for even now we have early maturing hybrids that will mature in our short growing season and supply us with an abundance of succulent feed for our dairy cattle during our long winters.

Once in a while even staid Department of Agriculture officials and executive members of important associations must have their little joke. In the above photograph, officials of the Goodwill Potato Tour of the Maritimes and Maine, changed places and clothes, with the personnel on the train. Taken at Charlottetown, P.E.I., the picture shows, left to right, G. Henry Blakely, Pontypool, a newsboy; Harold Whiteside, Barrie, porter, Charlie Proudfoot, St. Bernardin, a provincial potato-grower and farmer on steps of coach; R. E. Goodin, of the Department of Agriculture, and director of the tour, train conductor; Charlie Buchanan, veteran retired agricultural representative now living in Thamesville, a red cap; J. Nicol Wilson, Alliston, is the policeman standing at the left and on his right is Stewart Thompson, Mount Albert. The ladies, almost hidden by Mr. Buchanan, are the Misses Cole and Rawlinson, who also took in the trip.

Cash Crops

The growing of seasonal cash crops has not been extensive owing to the great distances from central markets but have been limited to the growing of vegetables on farms adjacent to our mining, lumbering and railroad towns.

However, considerable success has been attained in growing canning peas which are processed in New Liskeard. This product is of superior quality and is in excellent demand on outside markets.

Summary

Realizing that Northern Ontario has its limitations imposed by climate, the nature of our soil, the physical make up of our country with its widely scattered areas of farming land we should at the same time recognize the many advantages we have. We live in a good land full of surprises. Any day a new Hollinger or an Elderado mine may be discovered. We have seen modern cities rise in the wilderness in the space of two or three years. One by one many rivers are being harnessed to generate power for new industries. We expect to see our cities continue to grow and our markets expand. We have a beautiful land dotted with lakes and streams, a hunter and fisherman's paradise and though we farmers don't do much hunting or fishing its nice to know we can if we are so inclined. As to the profitable production of any crop the fact remains that the deciding factor in this regard is the individual farmer himself. If we are to make continued progress we must study and know our soil, be quick to put into practise every new Agricultural scientific discovery applicable to our country and learn to market our products in such a manner as to take care of the changing needs of the customers we supply.

Deep down in our hearts we love the land our fathers cleared and left us and we want our boys to continue on in our name. Its ours to show these lads that farming is a profitable enterprise with rewards that are satisfying and enduring.

In closing, should you ever be in Powassan in the summer time you are welcome to come and see me at the farm and I'll show you a few good fishing holes. The trout are there.

Owing to increased numbers of requests for information pertaining to liquid fertilizers, the Ontario Fertilizer Board has released the following statement:

"Liquid fertilizers disregarding cost are very convenient for house plant use, green houses, etc. A gallon of commercial liquid fertilizer containing approximately 2½ pounds of actual plant food costs approximately $5.00. The same quantity of plant food in the dry form costs around 30 cents. On a ton basis, a 5-10-5 fertilizer in the dry form costs approximately $45.00. The same quantity of plant food in the form of liquid fertilizer costs over $800.00."

"To date, there is no experimental evidence under Ontario conditions to indicate that liquid fertilizers have any more beneficial effects on growth of farm crops than ordinary dry fertilizers of the same analysis when properly applied."

"Those desiring a liquid fertilizer solution are referred to page 27 of bulletin No. 463, Soi Management and Fertilizer Use."

PROGRESS IN LAND CLEARING AND DRAINAGE

by J. P. S. Ballantyne, Commissioner, Agricultural Development for Northern Ontario, Cochrane

THE SPRING of 1949 in Northern Ontario was rather backward, as cool weather prevailed until June 1, and while some seeding was done in the first part of May, seeding was not general until well on in the month. Due to cool weather, germination and growth of cereals were rather backward, with the consequence that grain crops in general were not up to normal. Quality was fair and while the yield was light, a fair amount of good feed grain was threshed in all the Districts. With hay, the situation was better. We had an abundant rainfall in June. This, together with favourable weather conditions for harvesting hay meant that we have a very large crop of good quality hay, which will materially help and benefit those Districts not so well favored by climatic conditions to the South. We must have the production of crops so essential in the feeding of the human race as well as the animal kingdom. For without the products of Mother Earth, neither can exist for very long.

The Policies for Clearing, Breaking, Drainage, also subsidy on Drilled Wells, were carried on in 1949 in the eleven Districts of Northern Ontario, namely, Algoma, Cochrane, Kenora, Manitoulin, Muskoka, Nipissing, Parry Sound, Rainy River, Sudbury, Temiskaming and Thunder Bay.

Drainage work is one of the vital factors in successful farming in Northern Ontario, as we have flat land and generally speaking heavy clay soil. Where adequate drainage is not in effect, it just means that crops cannot be seeded in the Spring in time that they may mature, and the same applies in the Fall in taking them off.

It is very gratifying for me to see the real progress that has been made in all Districts, to see crops seeded on time and taken off under proper conditions, where previously this was not possible under the conditions that existed previous to the starting of the work in 1946 by Col. the Honourable Thos. L. Kennedy, and his staff. I want to commend the excellent co-operation of the Agricultural Representatives in the various Districts, and also their Director, Mr. J. A. Garner. It is indeed a pleasure to work with those men, as their help has been of great benefit in the progress of the work.

We had ten part-time fieldmen, measuring and checking, clearing and breaking of land; also chaining ditches that had been completed as the work progressed. I feel that in future, more full time men will have to be employed in the summer months, as all applications for clearing and breaking require inspection before grants can be awarded. In a great many cases, farms will have to be measured as to acreage cleared, as there are a great many farms that are on the border line where they have their 80 acres cleared.

I would like to mention here, some of the benefits derived from Drainage in the Cochrane District, especially in the Township of Mountjoy, that lies west and north of Timmins. Where heavy timber existed in the Spring of 1946, large areas have been cleared of timber and put under cultivation, due entirely to drainage. This is very gratifying to see, and goes to show where some help is given in this arduous work of clearing and breaking, what can be accomplished in a short space of time in these pioneer Districts that are opening up Northern Ontario for future Agriculture.

What is true in the Cochrane District is true of the other ten Districts that we are working in. When you see luxuriant crops of grain and hay growing where heavy bush existed in 1946 when this Policy was put into effect, it shows the benefit and help that this assistance is giving to the people who are the Backbone of every nation, and I mean those employed in the Production of Agriculture, products that go to feed a nation. Judging from conditions in Northern Ontario as a whole, agriculture seems to be in a very healthy state. I have never seen so much construction work as being undertaken in the various districts as this past summer of 1949. Large barns being built and equipped, new houses, foundations under old ones, and much improved conditions in all rural areas, Hydro that is being put into many of the districts, and a general air of prosperity that is essential to make happy conditions in the rural areas of Northern Ontario.

D. Clive Betts is shown presenting cheque for $3,000 to Dr. G. P. McRostie, head of the Field Husbandry Department, Ontario Agricultural College. The gift is from the Canadian Barley Improvement Institute and is to be used for research in barley improvement at the O.A.C. Presentation took place at a dinner meeting of the institute at the King Edward Hotel. Dr. McRostie also received an award of merit for his contribution during the year to barley improvement.

"My interest is in the future," Charles F. Kettering once remarked, "because I am going to spend the rest of my life there."

Ontario - Dept. of Agriculture.
Annual Report, 1949